Sun Fire™ V440 Server

Just the Facts

SunWIN token # 386033

PARTNER VERSION

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Table of Contents

Sun Fire™ V440 Server Positioning..... 1
Introduction.....1
Product Family Placement 3
Features and Benefits.....5
Key Features.....5
Availability of Product 6
Target Users.....6
Target Industries.....7
Target Applications.....8
Selling Highlights 9
Market Value Proposition.....9
Key Messages.....10
Enabling Technology 11
UltraSPARC™ IIIi Microprocessors.....11
On Board Storage.....11
Memory Controller.....12
System Bus 12
Networking 12
Sun Advanced Lights-Out-Manager (ALOM).....12
Serial Management Port.....13
Network Management Port.....13
Environmental Monitoring and Control.....13
Low Power Consumption 14
Memory Subsystems 15
Automatic System Recovery (ASR) 15
Front Panel Features 15
Security Lock 16
LED Status Indicators.....16
Power Button 18
Keyswitch 18
Back Panel Features 20
1+1 Power Redundancy.....20
System Configuration Card (SCC) Reader 21
About Reliability, Availability, and Serviceability (RAS) Features.....21
Hot-Pluggable Components.....22
Sun FireTM V440 Block Diagram.....23
System Rackmounting.....25
Reliability, Availability, Serviceability (RAS).....25
Installation Data.....27
Hardware Dimensions.....27
Environmental Specifications.....27
Power Requirements.....27
Temperature.....28
Vibration.....28
Altitude.....28
Noise 28
BTU/Heat-load Data.....28
Humidity (noncondensing).....29
Regulatory.....29
Requirements and Configuration.....30

System Requirements....30
Licensing/Usage....30
Operating System Environment....30
Upgrades to Solaris 8 from Previous Versions....30
System Management....31
System Administration....31
OpenBoot Diagnostics....32
OpenBoot Firmware....32
Power On Self Test (POST)....32
Product Documentation....33
Solaris Bandwidth Manager Software....33
Solaris Management Console Software....33
Solaris Resource Manager Software....34
Solaris WBEM Services....35
Solaris Web Start Software....36
Solaris Web Start Wizards Software....36
Solstice CMIP Software....36
Solstice DiskSuite Software....36
Sun Cluster Software....37
Sun Enterprise Authentication Mechanism (SEAM) Software....38
Sun Management Center Software....39
SunScreen Secure Net Software....40
SunScreen SPF-200 Software....41
VERITAS NetBackup Software....41
Sun StorEdge Instant Image Software....42
Sun StorEdge LibMON Software....42
VERITAS Volume Manager (VxVM) Software....42
SunVTS Software....43
VERITAS File System Software....43
Performance Benchmarks—Reference....43
Ordering Information....44
Standard Configurations....44
Assemble to Order Configurations....45
Memory Configurations....46
Expandability....46
Storage Configuration Guidelines....46
Host Bus Adapters....46
Storage Configurations and Support....47
FC-AL loops....47
Multipathing and Benefits....47
Multipathing to the Internal Storage Array (with dual controllers)....47
Multipathing to External Arrays (with dual controllers)....47
Software Requirements to Implement Multipathing....47
RAID Implementation....48
USB Ports and Devices....48
Options....49
Unsupported PCI Adapters....53
Disk Arrays....53
Tapes and Tape Libraries....54
Upgrades....55
Sun Upgrade Advantage Program (UAP)....55
Key Messages....55
How To Order....55
Allowance Code Numbering Scheme....56
Upgrade Paths....56

Memory Configurations:....56
Software Upgrade Ordering....57
Service and Support....58
Warranty....60
Education....60
Glossary....61
Materials Abstract....63
Competitive Information....64
Point - Counterpoint....67
Where the Sun Fire V440 is the Ideal Solution....68
Where the Sun Fire V440 is not the Ideal Solution....68

Figure 1: Sun Fire™ V440 Server, front view

Introduction

Exceptional Price/Performance in a Compact Footprint

The Sun Fire™ V440 server is the latest member of Sun's powerful line of servers for enterprise network computing based on the UltraSPARC™ IIIi processor technology. This next-generation volume server brings multiprocessing power, Ultra320 SCSI disk drives, and the industry-standard Peripheral Component Interconnect (PCI) I/O bus to a rack optimized 4RU (rack unit) design. A standard 72" height Sun StorEdge rack contains 36 usable rack units and will fit up to 9 Sun Fire™ V440 servers, however, power and cooling requirements must also be considered. In addition, the Sun Fire™ V440 server delivers outstanding performance that users expect from Sun servers, while at the same time preserving 100 percent SPARC/Solaris binary compatibility with application software.

The Sun Fire™ V440 server gives customers the flexibility to scale their processing needs without wasting precious space, making it an ideal server for service providers, including ISPs and ASPs, the Financial Services sector, or anyone that requires a maximized CPU processing/memory density per square foot of floor space. In addition, many of these customers choose to scale horizontally, require the flexibility of attaching external storage via PCI expansion, and demand that our products help minimize single points of failure by supplying enhanced server management software and tools. The Sun Fire™ V440 server is intended for cost sensitive applications where price is one of the main buying criteria.

The Sun Fire™ V440 Server can be configured with from one to four processors running Solaris™ 8 HW 07/03 or later. Processors run at 1.062 GHz or 1.28 GHz using industry standard DDR1 memory DIMM's added in pairs. Each of the four CPU modules in a V440 system supports up to 4 DIMMs. The V440 will support 512MB and 1GB DIMMs, for a total system memory capacity of 16GB. The Sun Fire™ V440 server also supports four internal, 36-GB or 73-GB Ultra320 SCSI hard drives, and six PCI slots connected to three high-performance PCI I/O buses. The Sun Fire™ V440 server is designed to satisfy any application or enterprise where compute density at an affordable price is a high priority.

System main memory is provided by up to 16 DDR1 SDRAM DIMMs that operate at up to 133-MHz clock frequency. Total system memory is shared by all CPUs in the system and ranges from a minimum of 2 GB (one CPU/Memory board with four 512MB DIMMs) to a maximum of 16 GB (four boards fully populated with 1GB DIMMs).

The Sun FireTM V440 server employs a shared-memory multiprocessor architecture with all processors sharing the same physical address space. The system processors, main memory, and I/O subsystem communicate via a high-speed system interconnect bus, operating at a clock rate of up to 200 MHz. In a system configured with multiple

CPU/memory modules, all main memory is accessible from any processor over the system bus. The main memory is logically shared by all processors and I/O devices in the system. However, memory is managed and allocated by the CPU on its host module, i.e., the DIMMs on CPU/memory module 0 are managed by CPU0.

System I/O is handled by four separate Peripheral Component Interconnect (PCI) buses. These industry-standard buses support all of the system's on-board I/O controllers in addition to six slots for PCI interface cards. Three of the PCI slots operate at a 33-MHz clock rate, and three slots operate at either 33 or 66 MHz. All slots comply with PCI system Bus Specification Revision 2.2.

Internal disk storage is provided by up to four 1-inch, hot-pluggable, Small Computer System Interface (SCSI) disk drives. The basic system includes a SCSI disk backplane that accommodates four 36GB or 73GB Ultra320 SCSI disks. The system also supports external mass-storage solutions, with an external SCSI port located on the system's back panel.

External multidisk storage subsystems and redundant array of independent disks (RAID) storage arrays can be supported by installing single-channel or multichannel PCI host adapter cards along with the appropriate system software. Software drivers supporting SCSI and other types of devices are included in the Solaris operating system. In addition, the system supports internal hardware mirroring (RAID 1) using an onboard LSI1030 Ultra320 SCSI RAID controller.

The system provides two on-board Gigabit Ethernet ports, which support modes of operations at 10, 100, and 1000 megabits per second (Mbps). Additional Ethernet interfaces or connections to other network types can be provided by installing the appropriate PCI interface cards. Multiple network interfaces can be combined with multipathing software to provide hardware redundancy and failover capability. Should one of the interfaces fail, the software can automatically switch all network traffic to the alternate network to maintain network availability.

The Sun Fire TM V440 server provides two serial communication ports: one a DB-9 connector on the system back panel, and the other an RJ-45 connector (labeled SERIAL MGT) on the back panel of the Sun Advanced Lights-Out Manager (ALOM) system controller card.

The back panel also provides four Universal Serial Bus (USB) 1.0 ports for connecting USB peripheral devices such as modems, printers, scanners, digital cameras, or a Sun Type 6 USB keyboard and mouse. The USB ports support both isochronous mode and asynchronous mode. The ports enable data transmission at speeds of 1.5 Mbps or 12 Mbps.

The local system console device can be either a standard ASCII character terminal or a local graphics console. The default connection is through the serial management port on the back of the Sun Advanced Lights-Out Manager (ALOM) system controller card. You can connect an ASCII character terminal to the TTYB (DB-9) connector on the system back panel. A local graphics console requires installation of a PCI graphics card, monitor, USB keyboard, and mouse. You can also administer the system from a remote workstation connected to the Ethernet or from an ALOM console.

ALOM is a secure server management tool that lets you monitor and control your server over a serial line or a 10 Mb Ethernet network connection. ALOM provides remote system administration for geographically distributed or physically inaccessible systems. The firmware installed on the ALOM card allows you to monitor the system without having to install software before using it. The ALOM shell command tool, scadm, supplants much of the functionality of the OpenBoot environmental monitoring utility in previous systems.

The ALOM card runs independently of the host server, and operates off of 5-volt standby power from the system's power supplies. This allows ALOM to serve as a lights out management tool that continues to function even when the server operating system goes offline or when the server is powered off.

The basic system includes two 680-watt power supplies, each with two internal fans. The power supplies are plugged directly into the motherboard. One power supply provides sufficient power for a maximally configured system. The second power supply provides 1 + 1 redundancy, allowing the system to continue operating should the first power supply fail. A power supply in a redundant configuration is hot-pluggable, so that you can remove and replace a faulty power supply without shutting down the operating system or turning off the system power.

Some key applications are:

- E-mail services, web serving, Internet gateway, search engines, and encryption
- DNS, HTTP, and FTP services

- Financial services applications
- Database
- On-line transaction processing (OLTP) and electronic commerce
- Simulation and compute farms\(EDA)
- Government Applications

Product Family Placement

The Sun Fire™ V440 server is the latest member of the current volume server product family, targeted at the entry market, 4-way space, with scalability from the low-cost, high-performance two-way Sun Fire™ 280R, Sun Fire V210, Sun Fire V240, and up to the four-way Sun Fire™ V480, and finally the eight-way Sun Fire™ V880.

These systems have several things in common, including:
• The UltraSPARC processor family with 100 percent binary compatibility from the low end to the high end
• Scalable from the low-end uniprocessor systems to the 106-way Sun Fire 15K server
• Modular, easily replaceable components

Server	***Target Users and Markets***
Sun Fire™ V210 and V240 Servers (UltraSPARC IIIi)	The Sun Fire V210 and V240 servers are entry data center-class servers with high availability and expandability features. Featuring up to two 1GHz UltraSPARC[r] IIIi processors, four built-in gigabit ethernet ports, pre-installed software, a system configuration card, advanced remote management, and an optional integrated SSL card, the Sun Fire V210 and V240 servers provide exceptional compute density, network performance, and Sun ONE software at affordable prices.
Sun Fire™ 280R Server (2 processor UltraSPARC III)	The Sun Fire™ 280R (up to two 750MHz, 900 MHz UltraSPARC III microprocessors) extends the capabilities and performance of the UltraSPARC II based, Sun Enterprise 220R. The target customers for this server remain the same, i.e. internet, application, network service providers, and financial services.
Sun Fire™ V440 Server (4 processor UltraSPARC IIIi)	The Sun Fire™ V440 utilizes an integrated processor architecture optimized to reduce cost and maintain performance. The Sun Fire™ V440 represents a significant improvement in price/performance relative to other competitive four-way systems. The Sun Fire™ V440 utilizes the UltraSPARC IIIi processor which combines 1 MB of internal cache with processor speeds from 1.062GHz to 1.28GHz and up to 16GB of system memory in a compact 4RU package. Thus, providing maximized CPU processing/memory density per square foot of floor space.
Sun Fire™ V480 Server (4 processor UltraSPARC III)	Designed to provide the ultimate compute density at an affordable price. With the 900 MHz UltraSPARC III processor with 8 MB of ECC-protected external (L2) cache and the Sun Fireplane™ Interconnect, the Sun Fire™ V480 server offers exceptional processing power in a compact (5RU) rack optimized server package. The target customers are internet, application, service providers, along with financial services, compute farms, or any customers running CPU demanding applications.
Sun Fire™ V880 Server (8 processor UltraSPARC III)	The Sun Fire™ V880 is a rackmountable tower that is the high-end workgroup server. This versatile, high performance and reliable server provides a growth path for today's E450 and E3500 customers who require more application scalability, higher performance, and built in availability and reliability components.

The following chart provides a comparison of the family of Sun Fire Servers.

	Sun Fire™ V440	***Sun Fire™ V480***	***Sun Fire™ V880***
Product Positioning	Low-end 4-way Volume Server	Mid-size 4-way Volume Server	High-end 8-way Volume Server
Packaging	4 RU rack optimized, 25" Depth (includes bezel)	5 RU rack optimized, 24" depth	Tower or rack mountable 17 R, 32.9" Depth
Typical Environment	Data Center	Data Center	Branch Office, Department or Data Center
CPUs	1 - 4	2 - 4	2 - 8
Memory (Max.)	16 GB	32 GB	64 GB
System Bus	2.34 GB/sec.	9.6 GB/sec.	9.6 GB/sec.
I/O bandwidth	1.84 GB/sec.	1.2 GB/sec.	1.2 GB/sec.
Internal Storage	292 GB	146 GB	436 GB with 36.4 GB drives
Removable Media	DVD ROM only	DVD ROM only	3 slots for up to three 5.25" rem. media devices
PCI or cPCI slots: @66 MHz @33 MHz	6 (no cPCI) 3 3	6 (no cPCI) 2 4	9 (no cPCI) 2 7
Integrated Network	Two 10/100/1000 Ethernet	Two 10/100/1000 Ethernet	10/100 and 1 Gbit Ethernet
Input Power (110/240 VAC)	2 Power cords (1+1)	2 Power cords (1+1)	3 Power cords (N+1)
RAS Features	Hot pluggable disks, hot pluggable power supplies, ALOM, SCC, front and rear power and fault LED indicators	Hot pluggable disks, hot swap power supplies, RSC, multipathing to storage and networks, LED indicators for power, fans, and disks	Hot pluggable disks, PCI slots, fans, hot swap power supplies, RSC, multipathing to storage and networks, LED indicators for power, fans, and disks
Warranty	3 year, on-site, 2nd day service	3 year, on-site, 2nd day service	3 year, on-site, 2nd day service
Minimum O/S	Solaris 8 HW 07/03	Solaris 8 2/02	Solaris 8 7/01

Sun Fire™ V440 Server Features and Benefits

Features	Benefits
• Up to four 1.062/1.28 GHz UltraSPARC™ IIIi processors, each with 1 MB of internal ECC-protected (L2) cache and up to 4 GB of ECC (error correcting code) memory	• UltraSPARC™ III technology offers better scalability and enhanced performance as compared to previous generations of processors
• Space-efficient, rack-optimized 4RU and 24 inch depth enclosure	• This enclosure offers high compute density giving customers maximum value per rack unit.
• 1+1 power, with separate power cords	• A fully configured system can operate on one power supply; the second power supply is for redundancy and load balancing. Enhances system availability by masking an individual AC circuit failure.
• Dual Gigabit Ethernet interfaces and up to 16GB of memory	• Excellent I/O performance and memory capacity makes the Sun Fire™ V440 server an excellent web, e-commerce, or EDA server.
• 6 PCI slots (3 at 66 MHz, 64 bit wide and 3 at 33 MHz, 64 bit wide) across three PCI buses	• Allows users to configure systems according to their needs with additional network, storage, graphics adapters, etc. Eliminates contention among peripheral controllers thereby maximizing processing capabilities.
• Hot plug disks and hot plug power supplies	• On-line maintenance and repair enhances system availability
• Diagnostics and Security	• Front and back LEDs for easy quick diagnosis of system state. Physical security preventing access to enclosed hardware and preventing initiation of applications from unauthorized users.
• Automatic System Recovery (ASR)	• Monitors the system memory and automatically configures around failed DIMMs or failed PCI cards.. Enhances availability by restoring system to operation as quickly as possible. Minimizes the need for manual intervention.
• System Configuration Card (SCC)	• Allows the easy transfer of the confguration data from one system to another for improved availability.
• Advanced Lights-Out-Manager (ALOM)	• Monitors and reports system and component status. Allows remote management via network or serial connection. Reduces the overall cost of system management.
• SunCluster	• Enhances availability. Facilitates resource sharing.
• Install Checker	• enables users to confirm proper initial system configuration and installation.
• Solaris 8	• Provides full compatibility for binary applications across the UltraSPARC product line.

Key Features

- Rack-optimized chassis design provides modularity for flexibility, maximum system growth, and expansion potential.
  – Offers the flexibility of starting with 2 CPU modules and adding single modules later as compute needs grow.

– Provides memory capacity up to 16 GB maximum (4 slots per module using existing 1-GB DIMMs)
– Supports 36GB or 73GB drive options (supports 10K-rpm and 15K-rpm Ultra320 SCSI @320 MB/sec disk drives).
– Has expanded front-access capabilities: up to four hot-plug disk drives, power switch, Atapi Slimline media bay for DVD ROM, and up to two hot-plug power supplies.
– Allows for high I/O expansion with six full length, industry-standard PCI bus slots(3 @ 66MHz, 3 @ 33MHz)

- High-performance, low cost, UltraSPARC™ IIIi Processors
  – 64 bit SPARC™ architecture running at 1.062GHz and 1.28GHz.
  – 1 MB of ECC-protected internal (L2) cache per processor
  – Binary compatibility with previous SPARC™ processors, thereby providing ease of migration for existing applications
- SCC (System Configuration Card) increases availabilty by permiting system identity to be transferred top stand by systems.
- ALOM simplifies management of servers reducing cost and complexity in horizontal scaling environments.
- TCO: Data Center friendly server with low power and cooling requirements at an attractive price.
- Offers 1 to 4-way multiprocessing system based upon single processor/memory modules
  – Integrated Ultra320 SCSI @320 MB/sec disk subsystem with capacity for four 36 GB or 73 GB disks including HW Raid/Mirroring.
- Integrated Controllers
  – Integrated dual-channel SCSI disk controller, two 10/100/1000 Mb/s Ethernet ports, RJ-45 serial and four USB ports
  – Saves PCI slots for user selectable controllers
  – Cost effective, familiar to those from the PC environment
- I/O Subsystem
  – 1.84 GB/sec. throughput capability
  – All I/O is distributed across four PCI buses. The PCI cards are distributed across three independent PCI buses to minimize contention among controllers and maximize processing capabilities with the fourth reserved for Ethernet and Internal disks. PCI buses are distributed as follows:
    PCI bus 1: 3 PCI slots @ 33MHz
    PCI bus 2: 2 PCI slots @ 66MHz
    PCI bus 3: 1 PCI slot @ 66MHz and Ethernet
    PCI bus 4: Ethernet and 4 internal Ultra320 SCSI @320 MB/sec disks
  – PCI based controllers provide industry standard, economical I/O adapters
- Solaris Operating Environment
  – Utilizing the multiprocessor capabilities of the Sun Fire™ V440 server, a customer can leverage the performance capabilities of Solaris Operating Environment's multithreaded application base.
  – As a result of Solaris, all previous applications developed and running on Solaris 2.6 and Solaris 7 can be run without recompiling.
  – Implementing Sun's UltraSPARC IIIi processor, memory, and J-Bus Interconnect architecture, a company will notice the significant improvement in application price/performance.
  – Solaris supports superior Reliability/Availability/Serviceability (RAS) for secure, large-scale, e-commerce applications.
  – Binary compatibility with previous releases.

Availability of Product

Volume shipments for the Sun Fire™ V440 Server are scheduled for Q3CY2003.

Target Users

The Sun Fire™ V440 server is a cost effective four-way server that provides users the ability to horizontally scale their environment with a significant price/performance advantage over comparable competitive systems. The Sun Fire™

V440 Server was designed as a general purpose workgroup server capable of meeting the needs of a wide range of industry applications, users and environments. This four-way multiprocessor, combined with a 2.3GB/sec interconnect, 1 MB of internal ECC protected cache, dual GB Ethernet, six available PCI slots, integrated Ultra320 SCSI @320 MB/sec disk subsystem, and 16GB of memory capability, ensures scalability in even the most compute-intensive environments and applications.

Target Industries include Service Providers, Financial Services, and compute server markets as well as government, utilities, and retail.

Target Industries

Target Markets	**Applications**
Financial Services • Insurance • Stock and commodity traders • Banking	• Equity trading, OLTP, on-line banking
Service Providers • Internet Service Providers • Network Providers • Portals • Commerce Providers • Application Service Providers	All aspects of internet capabilities including access, web hosting, and supporting on-line merchants and service providers, i.e. order processing, scheduling, call center tracking, etc.
Manufacturing • Discrete manufacturing • Process manufacturing	IT, Finance and Accounting, Human Resources, ERP/MRP solutions, Supply Chain management, Engineering, Sales & Marketing, Customer Service, and Electronic Commerce
Telecommunications and Internet Services	Internet HTTP, email, FTP, directory servers, and electronic commerce and message switching
Retail	In-store electronic retail systems, merchandising systems, inventory management, distribution, and electronic commerce, CRM
Government • City/municipal • State/provincial • Federal/national	Branch office systems, departmental servers, repositories for public works program documents and engineering plans, financial records
Healthcare • Hospitals and Clinics • HMOs and Managed Care Providers • Medical equipment OEMs	Satellite office servers, patient records, billing, claims processing, medical imaging systems, picture archival, and communications systems
Education	Registration and student records, financial aid administration, academic research
Scientific/Research/Analysis (Compute Farms) • EDA • MCAD	High performance applications, MCAD, EDA, CFD (computational fluid dynamics), simulation and modeling, statistical analysis, scientific research, departmental repositories

Target Applications

Applications	Key Features to Highlight
Database or Digital Media Management	• Outstanding storage connectivity with PCI card. • Exceptional network connectivity and I/O bandwidth
Distributed Database Access	• Outstanding network connectivity, computing power, network I/O performance, total system throughput • Reliability and availability features
Online Transaction Processing (OLTP)	• Balanced computational and I/O capacity • Storage I/O and Network I/O performance • Robust development environment • Scalable operating system
E-mail Web Mail Services Internet Gateway	• Connectivity with heterogeneous systems and networks • Exceptional scalable multithread performance • Exceptional total system throughput
Decision Support • Online analytical processing	• Scalable computing power • Storage connectivity and I/O performance
Groupware, Collaboration • Lotus™ Notes	• Enterprise networking and PC inter-operability • Supports hundreds of UNIX or PC clients
Internet • Internet Providers • Application Service Providers	• Secure, reliable and cost effective • Sun is the leading internet provider, majority of the servers on the Internet are Sun servers
Inter-operability	• PC Netlink
Compute Intensive • ECAD • CFD • Simulations	• Compute density – 4RU, 24" depth rack based system • Large memory with low access latency • High system bandwidth • Scalability • Capable of 4GB of memory per processor

Selling Highlights

Market Value Proposition

Sun Fire TM V440 Server will bring new UltraSPARC IIIi technology to our customers in a four CPU, rack optimized enclosure configuration.

Value Proposition 1: LOW solution costs - the Sun Fire V440 server with its support for the reliable and secure Solaris/Sun One software stack provides customer the capability for low cost horizontally scalable solutions.

Value Proposition 2: LOW priced 4-way server for Network Computing - The Sun Fire V440 Server is priced to beat competitive Lintel, Wintel, and UNIX 4-way rack-optimized servers.

Value Proposition 3: LOW Total Cost of Ownership - Low product procurement costs, reduced power and cooling requirements, and SPARC/Solaris binary compatibility.

Value Proposition 4: COMPETITIVE price/performance - UltraSPARC IIIi technology is designed for low cost computing

Value Proposition 5: REDUCED Customer Cost and Complexity - Advanced Lights Out Manager (ALOM) provides remote management functionality lowering the requirement for onsight staff. The System Configuration Card (SCC) increase system availability by enabling fast return to service in the unlilkely event of a failure.

Key Messages

The Sun Fire™ V440 server helps customers to:

- Build low cost network solution by supporting Solaris and the Sun ONE software portfolio.

- SPARC/Solaris software binarly compatibility ranging from low end uniprocessor systems to the 106-way E15K server.

- Reduce real estate cost and increase return on investment with its high density (4P/4RU) form factor. The Sun FireTM V440 server is part of the ultra dense, UltraSPARCIIIi based, rack optimized server family of products including the Sun FireTM V240 and Sun FireTM V210.

- Scale systems to suit specific application needs with up to four UltraSPARC IIIi CPUs, six PCI slots, up to nearly 300GB of internal storage, and a maximum of up to 16GB of memory.

- Lower TCO due to aggressive price points, dense from factor, and low power and cooling requirements that help to alleviate growing pressures on shrinking IT budgets.

- Improve network performance and efficiency with the two built-in 1 Gb Ethernet ports of the Sun FireTM V440 server.

- Reduce complexity via the Advanced Lights Out Manager (ALOM) integrated system management and Sun Management Center (SunMC) hardware and software.

- Achieve higher availability for mission-critical applications with redundant, hot-pluggable components and serviceability with a pre-installed System Configuration Card (SCC) that can easily transfer system identity from one system to another.

Sun Proprietary and Confidential

Enabling Technology

Technology Overview

The Sun Fire™ V440 is the next generation server available for high-density, compute-intensive environments. Design characteristics are focused on a low-entry price point with high performance, serviceability, and reliability. The Sun Fire™ V440 server is powered by one to four UltraSPARC IIIi CPUs and can be configured with up to 16 GB of memory to support any application to offer the widest flexibility in service delivery.

The Sun Fire™ V440 server is targeted at Tier 1 and Tier 2 applications like Web servers, media streaming, caching, security, and application servers. The architecture and design of the server provides an extremely powerful and well balanced system to eliminate bottlenecks and maintain service availability.

Sun Fire™ V440 servers have the following system architectural features:

- UltraSPARC IIIi processor(s) with integrated 1MB of on-chip (internal) L2 cache
- Superscalar SPARC V9 processor technology
- J-Bus system databus, running between 177MHz for 1.062GHz configuration and 183MHz for 1.28GHz configuration.
- Integrated Networking
- ALOM
- Low power consumption

UltraSPARC IIIi Processor

The UltraSPARC IIIi processor is a highly integrated processor that implements the 64-bit, SPARC V9 architecture and Sun's Visual Instruction Set (VIS). The UltraSPARC IIIi processor contains primary data and instruction caches and a unified 1MB L2-Cache. It also contains a DDR1 SDRAM memory controller, a JBus controller, and sophisticated power management capabilities.

A high performance integrated processor, the UltraSPARC IIIi processor is used with a wide range of applications. Its RISC architecture and VIS instruction set make it ideally suited for compute servers and embedded applications in tele-communications and imaging. Support for the Visual Instruction Set (VIS) is the means to accelerate multimedia, networking encryption and Java processing.

System Storage

The Sun Fire V440 server uses an intelligent, two-channel 320 MB/sec Ultra320 SCSI controller. Integrated into the motherboard, the conroller resides on the PCI Bus 2B and supports a 64-bit, 66MHz PCI interface. The on-board Ultra320 SCSI controller provides hardware RAID mirroring (RAID 1) capability with higher performance than conventional software RAID mirroring. One pair of hard disk drives can be mirrored using the on-board Ultra320 SCSI controller.

Internal disk storage is provided by up to four 1-inch (2.54-cm) high, hot-pluggable, Small Computer System Interface (SCSI) disk drives. The basic system includes an Ultra320 SCSI disk backplane that accommodates four 36GB or 73GB disks capable of data transfer rates of up to 320 MB/sec (MBps). The system also supports external mass-storage devices, with an external SCSI port located on the system's back panel. Internal and external SCSI devices are on independent buses, providing better performance for both buses.

External multidisk storage subsystems and redundant array of independent disks (RAID) storage arrays can be supported by installing single-port or dual-port peripheral component interconnect (PCI) host adapter cards along with

the appropriate system software. Software drivers supporting SCSI and other types of devices are included in the Solaris operating system. In addition, the system supports internal hardware mirroring (RAID 1) using the on-board Ultra320 SCSI controller.

Memory Controller

The memory controller integrated to each CPU, controls the addressing and retrieving of memory data. Memory is divided as "local," which is accessible by the CPU itself, and “foreign,” which has to be retrieved from the memory controlled by another CPU. There is a minimal overhead when retrieving foreign data transactions because addressing and data transfers are realized in completely separate buses.

The supported memory is DDR-1 SDRAM PC2100 DIMM installed in 16 DIMM slots, 4 per processor, and they are divided in two banks of 2 equal size DIMMS. The available capacity per DIMM slot will be 512MB and 1GB.

System Bus

The system bus provides high throughput paths clocked at 177MHz when using the 1.062 GHz CPUs and at 183 MHz when the 1.28 GHz CPUs are installed. The system bus is a memory-coherent interconnect joining the four CPU modules and the two System J-bus-to-PCI bus ASIC Bridges. J-Bus provides a memory-coherent 128-bit shared address/data path between each of the J-Bus resident devices.

I/O Interface

The system provides two RJ-45 on-board 10/100/1000Base-T Gigabit/Fast Ethernet ports for high throughput.

The system also provides a standard serial communication port (ttyb) through a DB-9 connector located on the back panel.

For additional storage capabilities, four 12Mb/s USB 1.0 ports are available to attach USB Jazz and Zip drives and other supported products.

For additional networking connectivity or storage redundancy, six PCI slots (3x33 MHz and 3x33/66 MHz all at 64-bits) are available on the Sun Fire™ V440 server.

Sun Advanced Lights-Out-Manager (ALOM)

Sun Advanced Lights Out Manager (ALOM) system controller is a secure server management tool that comes preinstalled on the Sun Fire V440 server. It lets you monitor and control your server over a serial line or over a network. The ALOM system controller provides remote system administration for geographically distributed or physically inaccessible systems. You can connect to the ALOM system controller card using a local alphanumeric terminal, a terminal server, or a modem connected to its serial management port, or over a network using its 10/BASE T network management port.

When you first power on the system, the ALOM system controller card provides a default connection to the system console through its serial management port. After initial setup, you can assign an IP address to the network management port and connect the network management port to an ethernet network. You can run diagnostic tests, view diagnostic and error messages, reboot your server, and display environmental status information using the ALOM system controller software, even if the operating system is down or the system is powered off. The ALOM system controller can also send email alerts on hardware failures, or other important events that can occur on the server.

The ALOM system controller provides the following features:

- Default system console connection through its serial management port to an alphanumeric terminal, terminal server, or modem
- Network management port for remote monitoring and control over a network, after initial setup
- Remote system monitoring and error reporting, including diagnostic output
- Remote reboot, power-on, power-off, and reset functions
- Ability to monitor system environmental conditions remotely
- Ability to run diagnostic tests using a remote connection
- Ability to remotely capture and store boot and run logs, which you can review or replay later
- Remote event notification for overtemperature conditions, power supply faults, system shutdown, or system resets
- Remote access to detailed event logs

Serial Management Port

The serial management port (SERIAL MGT) provides access to ALOM system controller functions and is the default connection to the system console. All power-on self-test (POST) and ALOM system controller messages are directed to the serial management port by default.

Network Management Port

The network management port (NET MGT) provides you with direct network access to the ALOM system controller card and its firmware, as well as access to the system console and ALOM system controller messages. You can use the network management port to perform remote administration, including externally initiated resets (XIR).

Environmental Monitoring and Control

The Sun Fire V440 server features an environmental monitoring subsystem designed to protect the server and its components against:

- Extreme temperatures
- Lack of adequate airflow through the system
- Operating with missing or misconfigured components
- Power supply failures
- Internal hardware faults

Monitoring and control capabilities are handled by the ALOM system controller firmware. This ensures that monitoring capabilities remain operational even if the system has halted or is unable to boot, and without requiring the system to dedicate CPU and memory resources to monitor itself. If the ALOM system controller fails, the operating system reports the failure and takes over limited environmental monitoring and control functions.

The environmental monitoring subsystem uses an industry-standard I2C bus. The I2C bus is a simple two-wire serial bus used throughout the system to allow the monitoring and control of temperature sensors, fans, power supplies, status LEDs, and the front panel system control keyswitch.

Temperature sensors are located throughout the system to monitor the operating temperature of the system and the CPU die temperature. The monitoring subsystem polls each sensor and uses the sampled temperatures to report and respond to any overtemperature or undertemperature conditions. Additional I2C sensors detect component presence and component faults.

The hardware and software together ensure that the temperatures within the enclosure do not exceed predetermined safe operation ranges. If the temperature observed by a sensor falls below a low-temperature warning threshold or rises above a high-temperature warning threshold, the monitoring subsystem software lights the system Service Required LEDs on the front and back panels. If the temperature condition persists and reaches a critical threshold, the system initiates a graceful system shutdown. In the event of a failure of the ALOM system controller, backup sensors are used to protect the system from serious damage, by initiating a forced hardware shutdown.

All error and warning messages are sent to the system console and logged in the /var/adm/messages file. Service Required LEDs remain lit after an automatic system shutdown to aid in problem diagnosis.

The monitoring subsystem is also designed to detect fan failures. The system features integral power supply fans, as well as two different fan assemblies. If any fan or blower fails, the monitoring subsystem detects the failure and generates an error message to the system console, logs the message in the /var/adm/messages file, and lights the Service Required LEDs.

The power subsystem is monitored in a similar fashion. Polling the power supply status periodically, the monitoring subsystem indicates the status of each supply's DC outputs, AC inputs, and presence.

NOTE: Two power supplies must be present at all times to ensure proper system cooling. Even if one power supply has failed, its fans obtain power from the other power supply and through the motherboard to maintain proper system cooling.

If a power supply problem is detected, an error message is sent to the system console and logged in the /var/adm/messages file. Additionally, LEDs located on each power supply light to indicate failures. The system Service Required LED lights to indicate a system fault. The ALOM system controller console alerts record power supply failures.

Low Power Consumption

The low power consumption of the Sun Fire™ V440 server gives greater flexibility in high-density rackmounting environments. In today's deployment scenarios where costs are driven down by reducing the amount of external resources that servers need, the Sun Fire™ V440 will be welcome because of its reduced power consumption and lower heat dissipation characteristics.

Memory Subsystems

The Sun Fire™ V440 uses industry-standard DDR1 Memory DIMMs. Each of the four CPU modules in a Sun Fire™ V440 system can contain up to 4 DIMMs. By using stacked DIMM technology, the Sun Fire™ V440 will support up to 1GB DIMMs, for a total system memory capacity of 16GB.

Automatic System Recovery (ASR)

The system provides for automatic system recovery (ASR) from component failures in memory modules and PCI cards.

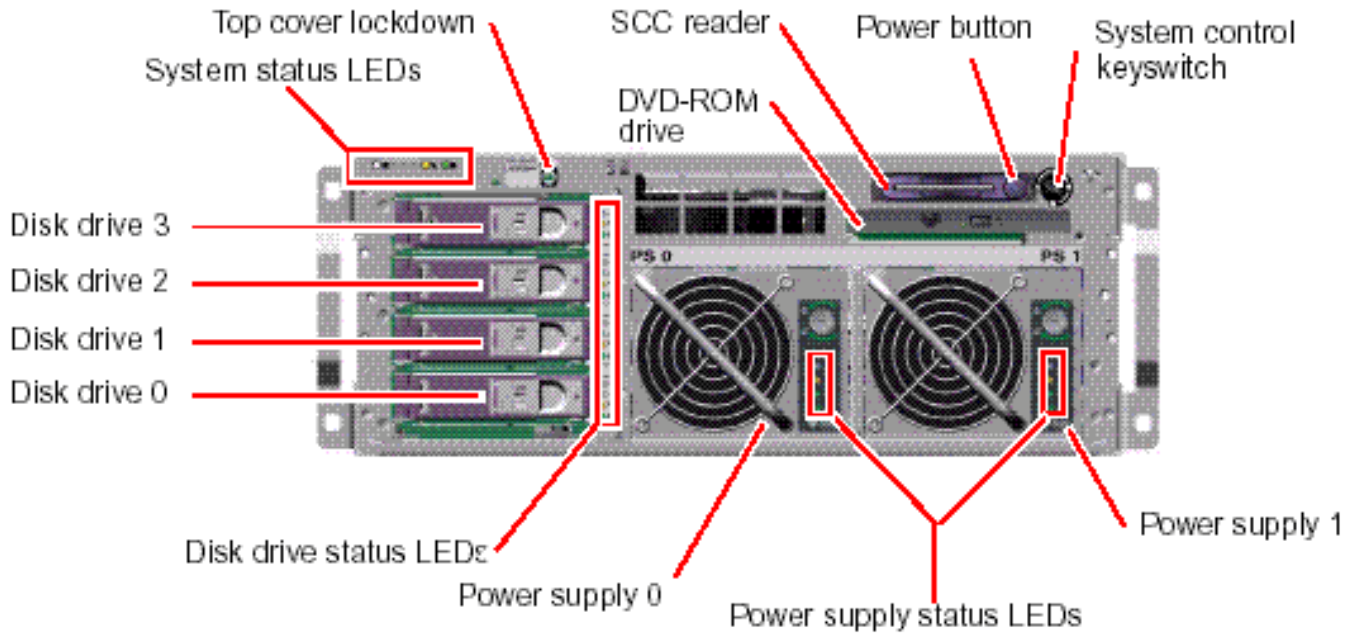
The ASR features allow the system to resume operation after experiencing certain non-fatal hardware faults or failures. Automatic self-test features enable the system to detect failed hardware components and an auto-configuring capability designed into the system's boot firmware allows the system to deconfigure failed components and restore system operation. As long as the system is capable of operating without the failed component, the ASR features will enable the system to reboot automatically, without operator intervention.

During the power-on sequence, if a faulty component is detected, the component is effectively disabled and, if the system remains capable of functioning, the boot sequence continues. In a running system, some types of failures (such as a memory module) can bring down the system. If this happens, the ASR functionality enables the system to reboot immediately if it is possible for the system to run without the failed component. This prevents a faulty hardware component from keeping the entire system down or causing the system to crash repeatedly.

NOTE: ASR functionality is not enabled until you activate it. Control over the system's ASR functionality is provided by a number of OpenBoot PROM commands and configuration variables.

Front Panel Features

Figure 2: Front Panel Features



Security Lock

A front panel security lock secures the system doors and the top cover. The system doors can be locked with one of the three keys supplied with the system. The system doors can also be locked with the supplied mini-key remaining in the system control keyswitch.

LED Status Indicators

Several LED status indicators on both the front and back panels provide general system status, alert you to system problems, and help you to determine the location of system faults.

At the top left of the system, as you look at its front, are three general system LEDs. Two of these LEDs, the system Fault LED and the System Activity LED, provide a snapshot of the overall system status. One LED the Locator LED helps you to locate a specific system quickly, even though it may be one of dozens or even scores of systems in a room. The front panel Locator LED is at the far left in the cluster.

Other LEDs located on the front of the system work in conjunction with specific fault LED icons. For example, a power supply fault illuminates the associated power supply fault LED. Since all front panel status LEDs are powered by the system's 5-volt standby power source, fault LEDs remain lit for any fault condition that results in a system shutdown. Locator, Fault, and System Activity LEDs are also found at the upper-left corner of the back panel. Also located on the back panel are LEDs for the system's two power supplies and RJ-45 Ethernet ports. See Sun Fire TM V440 Front Panel Features in Figure 2 on page 16**,** Sun Fire TM V440 Server Back Panel Features in Figure 4 on page 20 for locations of the front panel and back panel LEDs. During system startup, LEDs are toggled on and off to verify that each one is working correctly. The following tables list and describe the LEDs on the front panel: system LEDs, power supply LEDs, and hard disk drive LEDs.

Listed from left to right, the system LEDs operate as described in the following table.

System LEDs

Name	Description
Locator	This white LED is lit by Sun Management Center or Sun Advanced Lights-Out-Manager software, or by Solaris command, to locate a system.
Service Required	This amber LED lights to indicate that the system hardware or software has detected a system fault. This LED lights for any faults or failures detected in any of the following: – CPU/memory module – Memory DIMM – Fan tray – Power supply
System Activity	This green LED lights when the ALOM system controller detects that the Solaris Operating Environment is running.

Power Supply LEDs

Name	***Description***
Power supply OK-to-Remove	This blue LED lights when it is safe to remove the power supply from the system.
Power Supply Service Required	This amber LED lights when the system detects a fault in the monitored power supply. Note that the Service Required LEDs on the front and back panel also light when this occurs.
Power supply DC OK	This green LED lights when the power supply is on and outputting regulated power within specified limits.
Power supply AC Present	This green LED lights whenever a proper AC voltage source is input to the power supply.

Hard Disk Drive LEDs

Name	***Description***
OK-to-Remove	This blue LED lights when it is safe to remove the hard disk drive from the system.
Service Required	Reserved for future use.
Activity	This green LED lights whenever a disk is present in the monitored drive slot. This LED blinks slowly to indicate that the drive is spinning up or down, and quickly to indicate disk activity.

NOTE: Disk drives and Power supplies are hot-pluggable. However, certain software preparations are required prior to removing or installing a drive or power supply. Once the device is ready to be removed, the Blue LED will light indicating it is safe to remove.

Power Button

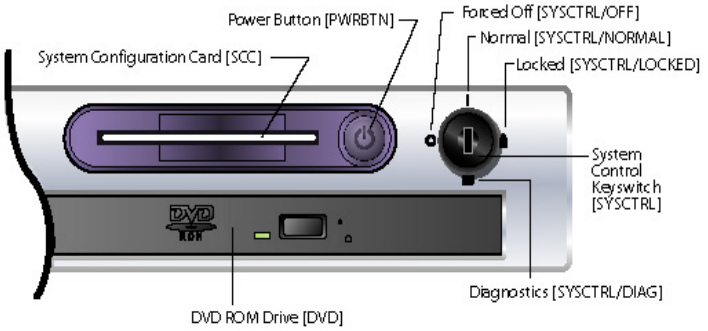
The system Power button is recessed to prevent accidentally turning the system on or off. The ability of the Power button to turn the system on or off is controlled by the system control keyswitch. The ALOM system controller can also control the power-on and power-off functions if environmental conditions are out of specification or if the ALOM system controller detects that the system configuration card (SCC) is missing or invalid.

If the operating system is running, pressing and releasing the Power button initiates a graceful software system shutdown. Pressing and holding in the Power button for four seconds causes an immediate hardware shutdown.

CAUTION: When possible, use the graceful shutdown method. Forcing an immediate hardware shutdown can cause disk drive corruption and loss of data.

Keyswitch

The four-position system control keyswitch on the front panel controls the power-on modes of the system. The system control keyswitch also prevents unauthorized users from powering off the system or reprogramming system firmware.



Chalupa Server: System Contol Area

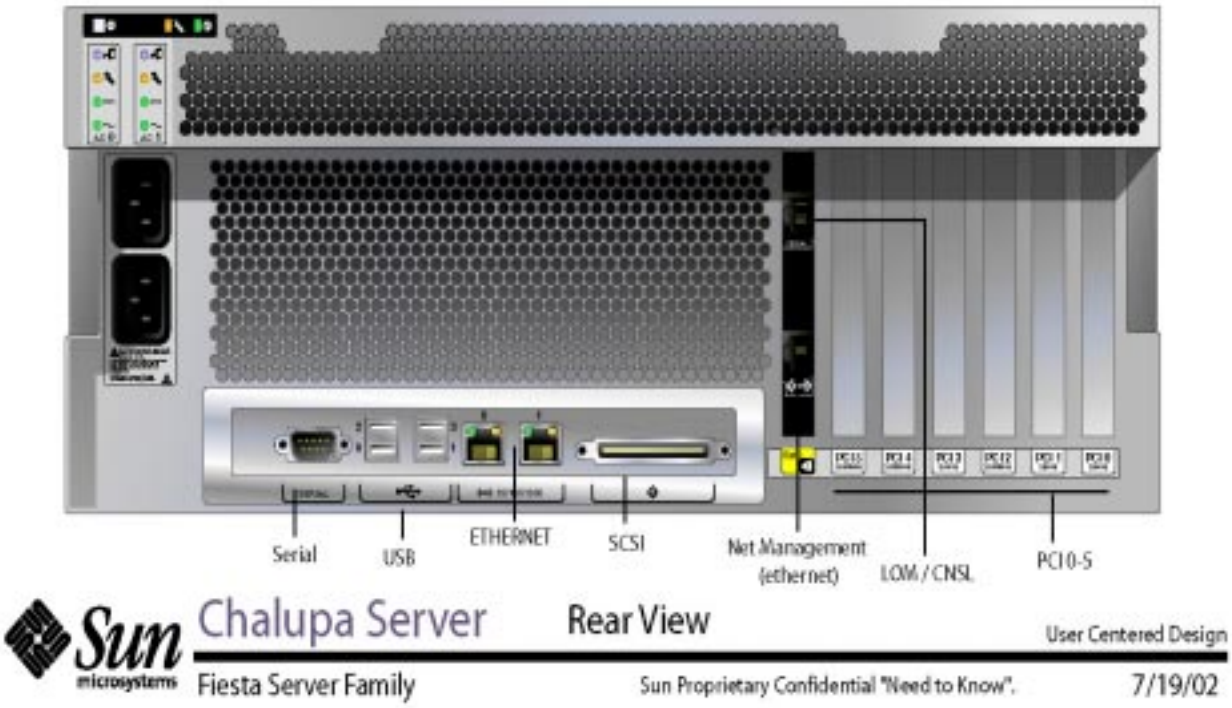
The following table describes the function of each system control keyswitch setting.

System Control Keyswitch Settings

Position	*Icon*	*Description*
Standby		This setting forces the system to power off immediately and to enter standby mode. It also disables the system Power button. This setting is useful when AC/DC power is interrupted and you do not want the system to restart automatically when power is restored. With the system control keyswitch in any other position, if the system were running prior to losing power and the power state memory is enabled in the ALOM system controller, the system restarts automatically once power is restored. The Standby setting also prevents anyone from restarting the system during an ALOM system controller session. However, the ALOM system controller card continues to operate using the system's standby power.
Normal		This setting enables the system Power button, allowing you to power the system on or off. If the operating system is running, pressing and releasing the Power button initiates a graceful software system shutdown. Pressing and holding the Power button in for four seconds causes an immediate hardware power off.
Locked		This setting disables the system Power button to prevent unauthorized users from powering the system on or off. It also disables the keyboard L1-A (Stop-A) command, terminal Break key command, and ~# tip window command, preventing users from suspending system operation to access the system ok prompt. The Locked setting is recommended for normal day-to-day operations, and prevents unauthorized programming by write-protecting system firmware. The ALOM system controller can still affect the system power state via a password-secured ALOM session, even when the system control keyswitch is in the Locked position. This capability provides remote management of the system.
Diagnostics		This setting forces the power-on self-test (POST) and OpenBoot Diagnostics software to run firmware diagnostic tests at power on or during reset events. The Power button functions the same as when the system control keyswitch is in the Normal position.

Back Panel Features

Figure 4: Back Panel Features



The back panel includes these features:

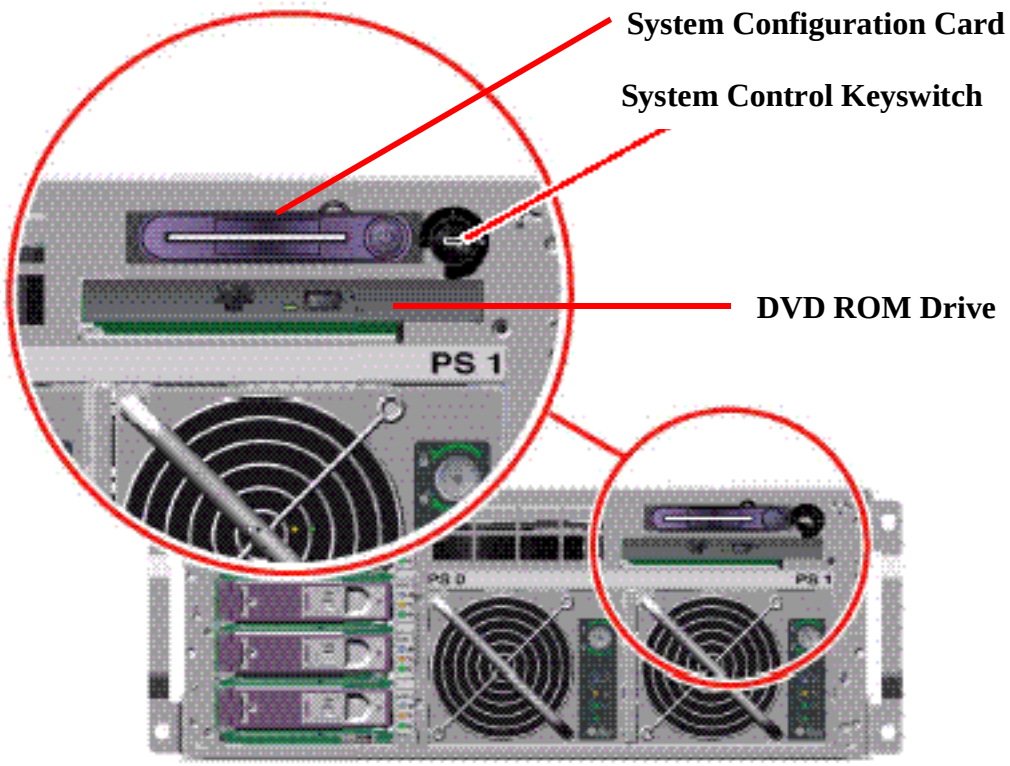
- System status LEDs
- Inlets for both AC power supplies
- Six PCI card slots
- Serial management port (labeled SERIAL MGT), located on the back of the ALOM system controller card
- Network management port (labeled NET MGT), located on the back of the ALOM system controller card
- Eight external data ports, including the following:
    - One DB-9 serial port (ttyb)
    - Four USB ports
    - Two Gigabit Ethernet ports
    - One Ultra320 SCSI port

1+1 Power Redundancy

The system features two hot-pluggable power supplies, either of which is capable of handling the system's entire load. Thus, the two power supplies provide 1+1 redundancy, enabling the system to continue operating should one of the power supplies or its AC power source fail.

NOTE: Two power supplies must be present at all times to ensure proper system cooling. Even if one power supply has failed, its fans obtain power from the other power supply and through the motherboard to maintain proper system cooling.

System Configuration Card (SCC) Reader



The system configuration card (SCC) reader contains the system configuration card. This plastic card stores the system's host ID, Ethernet MAC addresses for all on-board Ethernet devices, OpenBootTM configuration variables, and ALOM system controller user and system configuration data. The card performs the same functions that were performed by the NVRAM module in previous Sun systems, along with enhanced system controller support. Using the SCC, you can transfer this configuration data from one system to another.

CAUTION: The system configuration card must be installed and in place at all times while the system is running. If you remove the SCC while the system is running, the system will power off within 30 seconds. In addition, if the system is in standby mode and the SCC is missing, the ALOM system controller prevents the system from being powered on.

About Reliability, Availability, and Serviceability Features

Reliability, availability, and serviceability (RAS) are aspects of a system's design that affect its ability to operate continuously and to minimize the time necessary to service the system. Reliability refers to a system's ability to operate continuously without failures and to maintain data integrity. System availability refers to the ability of a system to recover to an operational state after a failure, with minimal impact. Serviceability relates to the time it takes to restore a system to service following a system failure. Together, reliability, availability, and serviceability features provide for near continuous system operation.

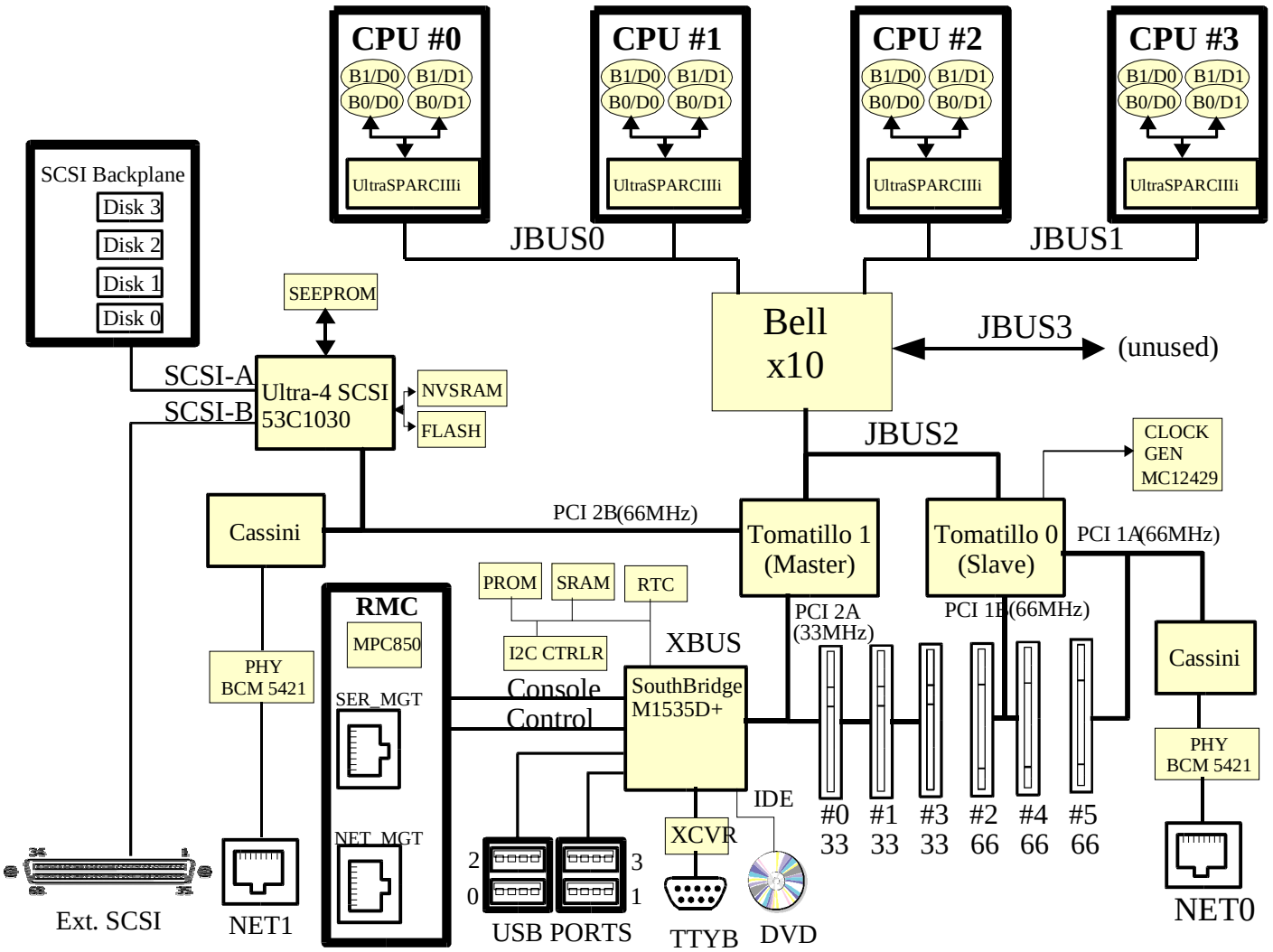
To deliver high levels of reliability, availability, and serviceability, the Sun Fire V440 server offers the following features:

- Hot-pluggable disk drives
- Redundant, hot-pluggable power supplies
- Sun Advanced Lights-Out Manager (ALOM) system controller
- Environmental monitoring and fault protection
- Automatic system recovery (ASR) capabilities
- Multiplexed I/O
- Hardware watchdog mechanism and XIR
- Hardware RAID mirroring (RAID 1)
- Support for disk and network multipathing with automatic failover capability
- Error correction and parity checking for improved data integrity
- Easy access to all internal replaceable components
- Full in-rack serviceability for nearly all components

Hot-Pluggable Components

The Sun Fire TM V440 hardware is designed to support hot-plugging of internal disk drives and power supplies. By using the proper software support, you can install or remove these components while the system is running. Hot-plug technology significantly increases the system's serviceability and availability, by providing the ability to:

- Increase storage capacity dynamically to handle larger work loads and improve system performance
- Replace disk drives and power supplies without service disruption



System Architecture

Figure 7: Sun Fire™ V440 Server, Block Diagram

Figure 8: Internal Disk

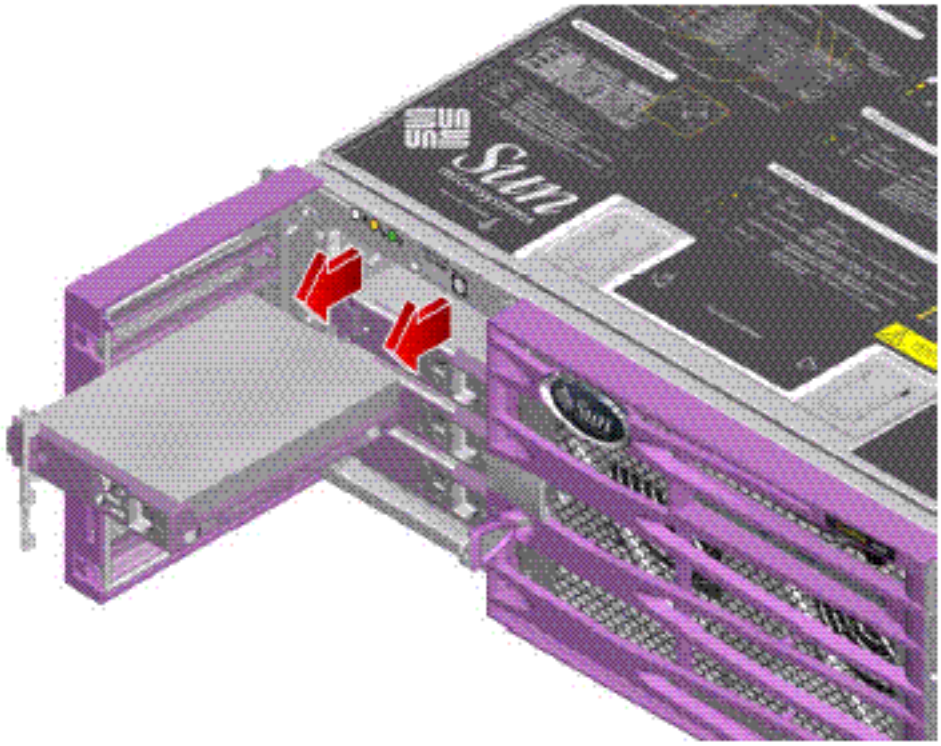
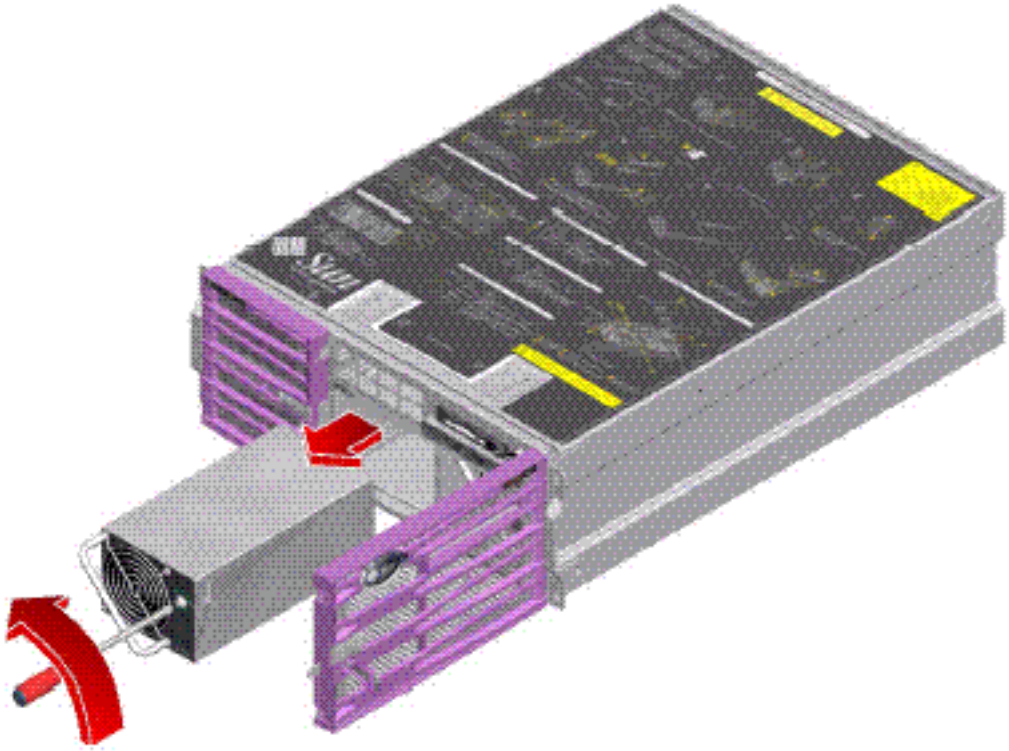


Figure 9: Power supply Access



System Rackmounting

The Sun Fire™ V440 Server is intended to operate in a four post rack within a data center. The system is only 24" deep and will fit in Sun StorEdge cabinet and most third party 30", 32" or 36" depth four post cabinets. Data centers typically arrange equipment within racks for the most efficient use of floor space. Each Sun Fire™ V440 ships with a Four post rack kit and cable management arm.

An optional two post rack mount kit, X7417A, is also available. The server is 4 rack units (RU) high and within a 36RU Sun StorEdge rack up to 9 fully populated Sun Fire™ V440 Servers can physically be installed, however, power and cooling requirements must also be considered. Each unit weighs from 70 lbs.(32kg) minimal configuration to 82 lbs. (37kg) fully configured.

For servicing in a four post cabinet, slide the system forward from the rack. The top panel opens for access to the processor/memory modules or the I/O subsystem, including the PCI adapters. The majority of components are capable of being serviced without dismounting from the slides. Power supplies and internal disk `drives are front accessible.

The Sun DeLorean Rack, SG-XARY030A, may be used. The Sun Serengeti Expansion Rack, SF-XCAB, may also be used. **(NOTE: Both currently under review for fit and regulatory approval)**.

Other manufacturers of cabinets include, but are not limited to:

- Rittal (www.rittal.com),
- Pentair (www.pentair-ep.com),
- APW/Wrightline (www.wrightline.com)

All offer four post cabinets that are 78" (2,000 mm.) high and 32" or 36" (800 or 900 mm.) deep. None of these products have been tested and neither the companies nor the products are endorsed or supported by Sun.

Reliability, Availability, and Serviceability (RAS)

Reliability, availability and serviceability are three aspects of the design and quality of a system that contribute to continuous operation and consequently, minimize system downtime.

- Reliability

  Reliability refers to a system's ability to operate continuously without failures and to maintain data integrity. Reliability influences MTBF.

- Availability

  System availability measures the percentage of time that a system is accessible by users and is providing service.

- Serviceability

  Serviceability measures the time to restore a system to operation once a failure has occurred. Serviceability influences MTTR.

Various metrics may be applied in calculating RAS, including:

- MTBF - mean time between failures. MTBF measures system reliability for duration until a system will fail. This measurement is influenced by quality, design, environmental considerations such as power and cooling and even operational errors, i.e. how well the hardware and software verifies the intention of staff.

MTBF

MTTR - mean time to restore. MTTR is a measure of system maintainability and usually includes diagnostic and repair times only. Dispatch and response time of service personnel are typically not included in this calculation as this factor is dependent upon service contracts (SLAs), geographical conditions, etc. which can radically influence the measurement. Nevertheless, these times will ultimately influence availability.

Simplistically stated, Availability = MTBF / (MTBF + MTTR)

These documents will indicate that the system can provide extremely high levels of availability.

MTTR

The vast majority of FRUs can be replaced in under 30 minutes by the average, trained service engineer. Those components requiring a longer time for replacement generally have a significantly higher MTBF.

The time for replacement does not include time for diagnosis.

Hardware Dimensions

	U.S.	Metric
Height • 4RU – Rack Based System	6.85"	174 mm
Width	17.3"	440 mm
Depth (Including 1.00” Bezel)	25.0"	635 mm
Weight (maximum)	82 lbs.	37 kg.

Environmental Specifications:

Power Requirements:

Minimum Configuration:

A42-XAB2-04GD, calculated using base system with 1 PCI card:
Power at the following nominal line voltage:
120VAC, 60Hz: 360W

Typical Configuration:

A42-XAB4-08GD, calculated using base system with 3 PCI cards :
Power at the following nominal line voltage:
120VAC, 60Hz: 570W

Maximum Configuration:
A42- XCB4-16GD , calculated using base system with 6 PCI cards :
Power at the following nominal line voltage:
120VAC, 60Hz: 650W

All specifications below pertain to a fully configured system. All specifications apply to operation at 50Hz or 60Hz. Refers to total power input current required for both AC inlets when operating with dual power supplies or current required for a single AC inlet when operating with a single power supply.
Smaller configurations will consume less power.

Temperature

	Fahrenheit	**Celsius**
Operating	41º to 104º F	5º to 40º C
Non-operating	-40º to 140º F	-40º to 60º C

Shock

Shock (IEC-60068-2-27)	3.0G's, 11 msec, half sine	15 G's, 11 msec, half sine; 1 inch roll-off front-to-back, 0.5 inch roll-off side-to-side

Vibration

	Operating	**Non-operating**
Vibration: **(IEC-60068-2-6&64)**	Sine Vibration	
	Z-axis: 0.15 G X/Y-axes: 0.10 G 5-500 Hz sine	Z-axis: 0.50 G X/Y-axes: 0.25 G 5-500 Hz sine

Altitude

Altitude: (IEC 60068-2-13)	**Operating**	**Non-operating**
	0 to 3,000m (0 to10,000 feet)	0-12,000 m (0 to 40,000 feet)

Noise

In accordance with ISO 7779:

Operating acoustic noise	6.7 Bels
Idling acoustic noise	6.7 Bels

BTU/Heat-load Data

Maximum Heat Dissipation @ 650W	2218 BTU/hr

Humidity (noncondensing)

Operating	20% - 80% noncondensing, 27° C max. wet bulb
Non-operating	5% - 93% noncondensing, 38° C max. wet bulb

Regulatory

Meets or exceeds the following requirements

Product Safety

- UL approval to UL 60950, EN60950, C22.2 No.60950, and CB Report for IEC 950; all including Amendments 1, 2, 3 , 4 and 11 and full worldwide deviations.
- TUV approval to EN60950/IEC 950.
- GOST Certification for Eastern Block countries.
- Korean MIC Certification.
- China CCC mark using UL as agent.
- CE Declaration of Conformance (SMI self-declaration) to The Electromagnetic Compatibility Directive and Low Voltage Directive with accompanying "Technical Data File".
- Approval to Argentinian standards using UL as agent.

EMI

- 47 CFR 15B (Code of Federal Regulations, Part 15, Subpart B) Class A
- EN55022 Class A per EMC Directive 89/336/EEC (CE Mark)
- VCCI Class A
- Industry Canada ICES-003
- AS/NZ 3548 (Australia/New Zealand)
- CNS 13438 (Taiwan)
- KSC 5858 (MIC Mark/Korea)

Immunity

- IEC 1000
  - EN55024 per EMC Directive 89/336/EEC, including
  - IEC 61000-4-2 Electrostatic discharge immunity test
  - IEC 61000-4-3 Radiated, radio-frequency, electromagnetic field immunity test
  - IEC 61000-4-4 Electrical fast transient/burst immunity test
  - IEC 61000-4-5 Surge immunity test
  - IEC 61000-4-6 Immunity to conducted disturbances, induced by radio-frequency fields
  - IEC 61000-4-8 Power frequency magnetic field immunity test
  - IEC 61000-4-11 Voltage dips, short interruptions and voltage variations immunity tests

Line Distortion

- EN 61000-3-2 per EMC Directive 89/336/EEC

Voltage Fluctuations and Flicker

- EN 61000-3-3 per EMC Directive 89/336/EEC

System Requirements

The Sun Fire™ V440 Server requires Solaris™ 8 HW 07/03 plus recommended patches, or later.

Note: Solaris 9 support will be available in the Solaris 9 HW 12/03 release.

Licensing/Usage

Operating System Environment

The Sun Fire™ V440 Server qualifies under the *Free Solaris™ Binary License Program.* For only a nominal cost of media and shipping, the Solaris™ 8 operating environment may be used without paying a license fee on an unlimited number of computers with a capacity of eight or fewer CPUs.

Please refer to www.sun.com/software/solaris/binaries for more details and to register under this program.

Upgrades to Solaris 8 from Previous Versions

Solaris™ 8 HW 07/03 or later is required for the Sun Fire™ V440. For customers who are running an earlier version of Solaris™, the *Solaris Application Guarantee Program* ensures that existing applications will run without modification on Solaris 8.

Please refer to www.sun.com/solaris/programs/guarantee for more details on this program.

Information in this section changes frequently please go to www.sun.com for the latest information.

System Administration

Built into the Solaris™ 8 Operating Environment are systems management and security features that will help deliver the computing environment demanded by customers. Sun also offers unbundled systems management products that will supplement the systems management features in the Solaris 8 Operating Environment. Together, the Solaris 8 Operating Environment management features and Sun optional systems management products create one of the most stable and available computing environment in the industry.

Virtually any administrative task can be executed over a remote connection from any client by an authorized administrator. And since a Solaris Operating Environment rarely requires rebooting, administrators will not lose their network connection when adding new software or reconfiguring the system. Solaris Operating Environment applications can be installed or upgraded on a Solaris server without affecting users and without disabling the network services running on that computer.

Management Function	**Sun Management Tools**	**Standard or Licensed Separately**
System installation, software installation	• Sun OpenBoot™ firmware • Solaris Web Start and Solaris Web Start Wizards™	• Standard • Standard
System configuration	• Solaris Management Console™ • Advanced Lights Out Manager (ALOM)	• Standard • Standard
User administration	• Solaris Management Console • Advanced Lights Out Manager (ALOM)	• Standard • Standard
Security management	• Sun Enterprise Authentication Mechanism™ • SunScreen™ Secure Net • SunScreen SPF-200	• Standard • Licensed separately • Licensed separately
Storage management	• Solstice DiskSuite™ • VERITAS Volume Manager • VERITAS File System • Sun StorEdge LibMON™ • VERITAS NetBackup • Sun StorEdge™ Instant Image	• Standard • Licensed separately • Licensed separately • Licensed separately • Licensed separately • Licensed separately
System monitoring	• Solaris Management Console • Sun Management Center (basic feature set) • Advanced Lights Out Manager (ALOM)	• Standard • Standard • Standard
Tuning, resource, and performance management	• Solaris Resource Manager™	• Licensed separately
Fault detection and recovery	• ShowMe How™ • Power On Self Test (POST) • OpenBoot Diagnostics • SunVTS™ • Sun Management Center • Sun Cluster	• Standard • Standard • Standard • Standard • Standard • Licensed separately
Upgrade administration	• ShowMe How	• Standard
Management application development environments	• Sun Management Center Developers Environment • Solaris WBEM Services	• Licensed separately • Standard

OpenBoot Diagnostics

OpenBoot Diagnostics (OBDiag) reside in flash PROM on the server's main logic board. OBDiag can isolate errors in the following system components:

- Main logic board
- DVD drive
- Disk drives
- Any option card that contains on-board self-test capabilities

OBDiag tests not only the main logic board, but also its interfaces:

- PCI
- Ethernet
- Serial
- Keyboard/mouse

OBDiag displays detailed diagnostic and error messages on a system console or on a local terminal if one is attached to the system.

OBDiag tests run automatically when the system control keyswitch is placed in the diagnostics position or when enabled through OpenBoot firmware configuration variables. Users can also run OBDiag interactively from the system OpenBoot monitor. When users run OBDiag interactively, they invoke the OBDiag menu, which lets users select which tests they want to perform. The system also provides configuration variables that users can set to affect the operation of the OBDiag tests.

OpenBoot Firmware

The OpenBoot firmware is stored in the boot programmable read-only memory (PROM) of the system. It is executed immediately after the customer turns on the system. The primary task of the OpenBoot firmware is to boot the operating system from either a mass storage device or from a network. The firmware also provides extensive features for testing hardware and software interactively.

The OpenBoot firmware provides a command line interface for customers at the system console. Customers can enter the OpenBoot environment by halting the operating system, using the Stop-A key sequence from the keyboard, or by power-cycling the system.

The OpenBoot device tree is a data structure that describes both the permanently installed and plug-in devices attached to a system. Both the user and the operating system can determine the hardware configuration of the system by inspecting the OpenBoot device tree.

Power On Self Test (POST)

The POST diagnostic code resides in flash PROM on the system's main logic board. It runs automatically when the system control keyswitch is placed in the diagnostics position or when enabled through OpenBoot firmware configuration variables. POST tests the following system components:

- CPU modules
- Memory modules
- Main logic board

POST displays detailed diagnostic and error messages on a local terminal, if one is attached to the system's serial management port.

Product Documentation

The documentation package includes a combination of printed and electronic technical information. In print, customers will receive Product Notes and a foldout, poster-size guide to installing the cable management system and instructions for powering on the system. The system cover itself provides a label with a graphical representation of the rackmounting procedure.

The technical manuals are delivered on CD-ROM in PDF and HTML formats. The Documentation CD provides the system technical manuals for installation, administration, diagnostics and trouleshooting, service, and use of the Advanced Lights Out Manager software. The manuals can be accessed in either PDF or HTML format using a convenient Graphical User Interface (GUI). The Documentation CD is usable on both Sun systems and PCs through commonly available browsers.

Additional features of the documentaion include translations of all manuals (except the service manual) into nine languages other than English. Manuals in HTML format comply with the Section 508 Accessibility requirements for users with disabilities. The Documentation CD supports searching for text across all appropriate PDF and HTML books in the document set. In addition the service manual includes ShowMe How (tm) animations of certain service procedures.

Solaris Bandwidth Manager Software

Solaris Bandwidth Manager software, available with Solaris ISP Server software, allows the administrator to control the bandwidth assigned to particular applications, users, and departments that share the same Internet link. By installing Solaris Bandwidth Manager software on their network's major links and application servers, and by setting consistent policies, customers can distribute bandwidth evenly. Customers can prioritize traffic, preventing a small number of applications or users from consuming all available bandwidth.

Solaris Bandwidth Manager software enables customers to:

- Provide differentiated classes of service to users, and bill accordingly
- Provide bandwidth to priority users, applications, or servers
- Reduce traffic congestion and increase network efficiency
- Control users and applications in their access to network resources
- Gather detailed network use statistics and accounting data for usage-based billing

Solaris Bandwidth Manager enables network service providers to get the most out of their existing network resources. It helps them to enable adequate levels of service to their customers, and collect accurate accounting information for usage-based billing.

Solaris Management Console Software

Solaris Management Console software, an integral component of Solaris Easy Access Server, makes it easy for administrators to configure and administer Solaris Operating Environment systems. Based on Java™ technology, Solaris Management Console software can launch any UNIX® application on any Solaris server in a network. It provides views of servers on the network as well as applications on those servers, which allows for easy local and remote administration of multiple servers running Solaris Management Console software. It also delivers powerful capabilities to make the process of adding users, hosts, or applications as simple as pointing and clicking from virtually any client on the network.

Solaris Management Console software enables administrators to register other Solaris Management Console servers and applications on the network. When the console is accessed, it dynamically configures tree views of registered hosts and services, making it easier to manage each Solaris server. Solaris Management Console software enables administrators to view activity on all their servers and modify applications and services running on them.

Solaris Management Console software allows administrators to launch applications, such as administration tools on a remote server, while monitoring the application via a light front-end GUI on the client. This eliminates the need to download large applications over the network and install and run them on the client. With Solaris Management Console software, remote servers can be managed easily with tools already located on the server. This remote capability allows administrators to manage administrative and network services from home or virtually any other location without having to come to the network operation center when a trouble call comes in.

Solaris Management Console software makes Solaris Operating Environment administration easier by providing:

- Centralized administration—current Solaris Operating Environment administration tools can be integrated and run from one location
- Centralized management—all servers on a network can be managed from a single console
- Single login—eliminates multiple logins into applications launched by Solaris Management Console software
- Instant access to administration tools by running existing Solaris Operating Environment administration tools found in Solaris Easy Access Server software

Solaris Management Console software also provides a set of wizards to simplify complex administration tasks:

- DNS server configuration
- DNS client configuration
- Default router modification
- Change root password
- Network connection configuration
- Shutdown/restart computer

Solaris Administration Wizards can be run from Solaris Management Console software or invoked via the command line. The wizards make the Solaris Operating Environment easy to administer by providing a point-and-click, Java technology-based graphical user interface (GUI) for configuring Solaris systems.

Solaris Resource Manager Software

Solaris Resource Manager 1.2 software helps you control costs and ensure that the enterprise applications your company depends on are allocated their share of available system resources. It redefines the traditional single application system model and offers a better solution by enabling you to consolidate multiple applications on a single UNIX® server or in a highly available Sun Cluster environment -- and deliver predictable service levels.

With Solaris Resource Manager software, you control server resources using methods similar to those found on expensive mainframes. Multiple users, groups, and applications can be guaranteed predictable service levels on a single server. By dynamically allocating unused CPU capacity to active users and applications, resource utilization is increased. And since you can set and enforce policies that control how resources are used, systems are easier to manage. Simply put, your enterprise makes the most of the resources it already has.

Ensures Service Availability

The challenge for IT managers today is to provide a consistent level of service to sites with large numbers of users. To accomplish this and keep costs under control you need the right tools. For example, power users, such as Wall Street traders, may occasionally need faster access to execute a complex query, while other users in the same environment have more consistent workloads. With Solaris Resource Manager software, you can allocate resources so that both groups get the responsiveness they need, when they need it.

Server Consolidation

Solaris Resource Manager achieves the long-sought goal of server consolidation. Enterprise Applications hosting multiple applications on a single system is simpler and more cost-effective than one application per system. For example, multiple ERP modules and database instances can be hosted on the same system that serves as a file and Web server. Web Site Hosting. Instead of purchasing large numbers of small servers, Internet service providers

(or corporations that host their own Web sites) can locate hundreds of Web servers on a single, easy-to-maintain machine. By managing resources, each customer (or department) receives the resources that they have purchased.

Resource Utilization and Allocation

Traditionally, servers have been configured to handle average utilization of 20-30 percent, with peaks planned for 75 percent. Solaris Resource Manager, on the other hand, lets you make full use of your resources, reducing overall costs. Solaris Resource Manager software is based on the concept of the "fair-share scheduler", where CPU resources are based on shares. As users log in or out, it automatically recalculates the proportion of resources allocated to each active user. Compare that to percentage-based allocation schemes that require the system administrator to reallocate percentages every time a new user is added.

Solaris Resource Manager software can keep rogue processes from running wild and consuming all the available processing power and virtual memory. It also has the ability to vary resources based on previous usage. It remembers how long ago a particular user logged on and what resources were used, and can allocate fewer resources to a more active user, so that even low-priority users or applications receive enough resources.

Hierarchical Control

Control can be as deep or shallow as desired. For instance, you can allocate shares to a department and then divide those shares among the individual users within the department. In short, Solaris Resource Manager software gives you greater flexibility in mapping resources to groups and individuals as needed.

Policy-Based Administration

Solaris Resource Manager software lets you configure limits for fixed resources. It can control the number of processes, number of logins, and connect time. Once you set a policy, it is automatically enforced. You can easily update the configuration at any time. In fact, you can use scripts to vary allocation based on time of day.

Resource Usage Tracking

Solaris Resource Manager software provides detailed usage data that can be input through user-defined tools or scripts into resource accounting or capacity planning programs.

Complementary Controls

Solaris Resource Manager software complements the high availability features of Sun Cluster. By leveraging the power of the Solaris Operating Environment, Sun Cluster software delivers high availability in mission-critical environments, helping ensure that applications and services are available when needed. With Solaris Resource Manager software, more efficient utilization of resources helps provide predictable application performance in highly available Sun Cluster environments.

Solaris Resource Manager software augments Dynamic System Domains on the Sun Enterprise 10000 and Sun Fire[tm] servers. Domains offer the ability to provide separate instances of the OS for each application or set of applications. These domains can increase or decrease in capacity based on changes in processor load. With Solaris Resource Manager, resources can be even more finely tuned for each domain.

Solaris WBEM Services

Part of the Solaris Easy Access Server, Solaris WBEM Services makes the Solaris Operating Environment manageable by tools from other enterprise management vendors. It also allows Solaris software tools to manage existing heterogeneous networks. This is because WBEM is compatible with existing major protocols, such as Simple Network Management Protocol (SNMP), Desktop Management Interface (DMI), and Common Management Information Protocol (CMIP). Developers can write WBEM agents or providers to convert information from these protocols to the CIM schema.

Solaris WBEM Services contains a set of tools (Sun WBEM SDK) and services to make it easier for software developers to create applications based on the CIM schema and XML/HTTP communication standards that manage Solaris software systems and administer the Solaris Operating Environment. By combining information from diverse applications, objects from different vendors can be managed as if they were from one vendor, which can greatly reduce the complexity and cost of managing such a heterogeneous system.

Solaris Web Start Software

Solaris Web Start software, a key component of the Solaris Operating Environment, is an easy-to-use Java technology-based application that guides system administrators through the installation of both the Solaris Operating Environment and co-packaged application software. Solaris Web Start software makes installing the Solaris Operating Environment as simple as clicking a button. Solaris Web Start software offers the industry's first Web-based installation process, enabling all of the setup and administration to be done locally or remotely through a web browser. It also virtually eliminates the UNIX system administration normally associated with software installation and setup. As a result, Solaris Operating Environment and co-packaged software can be installed by less-experienced administrators, or administrators familiar with Microsoft Windows installations, safely and easily.

Solaris Web Start Wizards Software

Solaris Web Start Wizards technology extends the point-and-click simplicity of Solaris Web Start software, bringing this same ease of use to applications written for the Solaris Operating Environment. Built into new applications, Solaris Web Start Wizards software simplifies the installation, setup, and administration of native Solaris Operating Environment and Java technology-based applications.

Applications built with Solaris Web Start Wizards software can be installed on a Solaris Operating Environment system locally or remotely from virtually any client running a web browser supporting the Java programming language.

With Solaris Web Start Wizards software, the source for an application may be a CD-ROM drive on the administrator's PC, a drive on the network, or a URL on the Web. The administrator may be using a Solaris Operating Environment workstation, a Microsoft Windows or Macintosh PC, or a network computer.

Solaris Web Start Wizards software is based on technology supplied by and supported by InstallShield Software Corporation, a industry-leading install tools vendor. For administrators, the inclusion of Solaris Web Start Wizards software with the Solaris Operating Environment makes installing applications as easy as installing Microsoft Windows applications.

Solstice CMIP Software

Solstice CMIP 8.2.1 software is the foundation of the Solstice Telecommunications Management Network (TMN) product family. It is the Common Management Information Protocol (CMIP) for other Solstice TMN software products such as Solstice Enterprise Manager software, Solstice TMN Agent Toolkit, Solstice TMN Agent Tester, Solstice TMN/SNMP Q-Adaptor, and Solstice TMNscript software.

Solstice CMIP software is the ideal solution for system integrators and telecommunications equipment manufacturers who want to develop CMIP-based management applications for their products and to deploy these applications to their customer base.

Solstice CMIP software enables the development and deployment of TMN applications and is delivered as two related products. The Solstice CMIP Standard Development Environment (SDE) is used to develop management applications that conform to the TMN management model.

Solstice CMIP Runtime (RT) is a standard implementation of the CMIP and the Common Management Information Service (CMIS). When it is combined with the SunLink™ OSI Communications Platform, Solstice CMIP RT forms a TMN Q3 stack and supports any application developed using Solstice CMIP SDE.

Solstice DiskSuite Software

Solstice DiskSuite software, part of Solaris Easy Access Server, is a disk and storage management solution for enterprise environments. It provides high data availability and reliability, delivers excellent I/O performance, and simplifies large system and disk administration. With Solstice DiskSuite software, customers get a powerful set of tools to enhance data availability.

- **Mirroring**

  Solstice DiskSuite software provides a comprehensive data-redundancy solution. It transparently maintains a mirror copy of data on another disk, and automatically uses the surviving copy in the event of hardware failure.

- **RAID 5**

  The RAID 5 feature in Solstice DiskSuite software provides highly available data storage at a lower cost by using less disk space than mirroring. Rather than having a single disk dedicated for parity, the parity information is distributed across all disks, thereby promoting relatively uniform usage of all disks associated with the logical unit.

- **Hot spare**

  On-line system recovery is supplemented by the use of a hot-spare utility that automatically replaces failed mirror or RAID-5 components. This facility migrates new partitions to replace failing ones. Users continue to access the surviving copy of the data while a new mirror is automatically generated, with no interruptions of operation.

- **UNIX File System (UFS) logging**

  When coming back online after a reboot, UNIX software typically checks file systems for integrity. Although a time-consuming process, especially on large systems, it was necessary to avoid data corruption. With the UFS logging feature in Solstice DiskSuite software, the need for this process has been eliminated. Reboots are much shorter, and system recovery is faster.

Solstice DiskSuite software offers a powerful yet simple graphical user interface (GUI) in addition to the traditional command-line interface. The GUI provides error-free setup of disks such as mirrors and UFS logs, as well as easy, on-going administration of disk subsystems. It delivers a visual representation of the storage subsystem along with drag-and-drop capabilities, both of which are invaluable in managing large, complex disk subsystems.

Other Solstice DiskSuite software features:

- Disk striping enables parallel I/O and load balancing for improved performance
- Multipathing support enables Solstice DiskSuite software to use multiple data paths in the case of failure
- A performance monitor helps eliminate bottlenecks
- Concatenation and the grow file system command allow the construction of large, logical devices, and enable online expansion and reconfiguration

Sun Cluster Software

Sun Cluster software provides higher levels of availability than is possible with a single server. This solution automates recovery from any single hardware or software failure by automatically restarting a failed application or migrating the application and its resources to a backup server in the event of a hardware failure.

Sun Cluster software provides mainframe-class reliability, availability, and scalability for e-commerce, ERP, data warehousing and other mission-critical applications and services. It delivers an easy-to-use, continuously available, multiplatform clustering solution that is completely integrated with the Solaris Operating Environment.

Key features of Sun Cluster software include support for Solaris 2.6 and 8 Operating Environment, up to four clustered nodes from Sun’s entire line of servers, failover agents for key applications, and a unified clustering foundation for standard and parallel applications.

Highlights include the following:

- Cluster up to eight servers to meet the needs of any workgroup, department, or data center
- Run both standard and parallel applications on the same cluster
- Dynamically add nodes
- Manage the cluster through the easy-to-use Sun Cluster Management Console
- Fault management API to customize applications for high availability
- Individual application failover, local application restart, and local network adaptor failover for fast recovery

- High-speed cluster interconnects and high-bandwidth networking deliver exceptional throughput

The Sun Fire™ V440 server supports Sun Cluster 3.0 and includes support for the following storage arrays:

- SunStorEdge 3310
- Sun StorEdge T3
- Sun StorEdge A1000
- Please refer to www.sun.com/software/cluster for additional information

Sun Enterprise Authentication Mechanism (SEAM) Software

Sun Enterprise Authentication Mechanism (SEAM) software, a component of Solaris Easy Access Server software, delivers an extra layer of security inside the firewall to protect the enterprise from unauthorized access. Through powerful authentication and single sign-on capabilities, SEAM software provides increased data privacy and integrity.

While firewalls are designed to fend off intruders from the outside, they cannot address security incidents that originate from within. Today, growing evidence indicates that most security breaches start with people inside or known to the enterprise. For true network security, customers need to take steps to protect the company's valuable data resources from unauthorized access from both inside and outside the enterprise.

Sun Enterprise Authentication Mechanism software provides the extra layer of security customers need to protect the enterprise. By combining centralized authentication with strong encryption, SEAM software provides a more secure login process, which helps customers to better protect their data privacy and integrity.

- **Centralized authentication and management**

  Sun Enterprise Authentication Mechanism software offers a single repository for enterprise authentication information called the Key Distribution Center (KDC). The KDC maintains a database of user, server, and password information. Through that database, SEAM software can authenticate users, servers, and applications. Anyone and everyone attempting to access information must first be checked against the KDC database before being ticketed as an authenticated user. Because security information is centralized, SEAM software allows customers to manage and control all enterprise-wide logins from a single console, which helps their enterprise reduce the total cost of administering and managing security.

- **Strong encryption support**

  Sun Enterprise Authentication Mechanism software provides strong encryption support. During the authentication process, all the information exchanged between customers and the KDC is encrypted for an extra level of security. SEAM software also uses an encrypted channel when storing KDC entries over the network.

- **Ease of use**

  Sun Enterprise Authentication Mechanism software supports a Java technology-based administrative tool for easy access and configuration. It also enables users to load authentication information in batch mode, which is particularly useful if the enterprise loses or gains large numbers of users each year.

  Sun Enterprise Authentication Mechanism software supports single sign-on capabilities. With single sign-on, SEAM software can authenticate users (to gain access to multiple applications) by ticketing them only once when they first log in. It also spares users the need to memorize multiple passwords, or enter passwords multiple times in a session.

- **Higher availability**

  Sun Enterprise Authentication Mechanism software's distributed architecture provides enterprises with higher availability. With SEAM software, customers can replicate their security information. This provides faster access to information as well as duplicate copies in the event of an emergency. Should the master KDC fail, the read-only replicated slave KDC still holds the necessary information for the authentication process to take place without interruption. What's more, if the master becomes unrecoverable, customers can easily convert the replicated slave to be the new master.

- **Faster performance**

  Sun Enterprise Authentication Mechanism software is faster and more reliable because its replicated KDCs reduce contention for security verification from across the enterprise. For example, replicas may be created for use by different business divisions or remote offices. Instead of competing for a single copy, the division or office has its own copy. Consequently, access to secured applications becomes faster.

- **Multiple realms**

  Sun Enterprise Authentication Mechanism software supports multiple realms. A realm is the set of users or servers registered with a specific KDC basically, the scope of authentication for a given KDC. Separating an enterprise into multiple realms enables SEAM software to operate across organizational boundaries and between different systems. A client in one realm can be authenticated to a server in another.

  SEAM software allows enterprises to isolate individual departments from each other, decentralizing control to local network administrators. For large corporations, realms enable SEAM software to be configured to allow administration at the local level.

- **A more secure environment**

  Currently, Sun Enterprise Authentication Mechanism software supports secure FTP, NFS software, Telnet, and r* commands. These secure network services, combined with strong encryption support, enable the enterprise to preserve data privacy and data integrity by eliminating snooping around the network and tampering with data. With SEAM software, users can access files securely over the network.

- **Interoperability**

  Sun Enterprise Authentication Mechanism software is compliant with Internet RFC 1510 and RFC 1964. These RFCs define the Kerberos V5 protocols, the de facto industry standard. Through this standards compliance, SEAM software allows enterprises to integrate with other vendors' compliant security products.

- **Cost-effective**

  Because Sun Enterprise Authentication Mechanism software is included in Solaris Easy Access Server software, it offers feature-rich security mechanisms with unlimited usage at a significantly lower cost than many third-party solutions available today. It requires fewer administrators because it is centrally managed, enabling customers to lower the cost of securing their enterprise.

- **Programmable security APIs**

  Sun Enterprise Authentication Mechanism software allows ISVs to secure their applications by Remote Procedure Call API (RPCSEC_GSS). This API is an implementation of the RPCSEC_GSS security protocol defined in Internet RFC 2203. When future security products from Sun or third-parties become available, these products can be easily plugged into the interface without requiring modifications to the application, enabling customers to adopt evolving security technologies quickly and easily. For example, if Sun developed a public-key security mechanism in the future, this mechanism would be easily accessible by any application that uses the RPCSEC-GSS interface.

Sun Management Center Software

Sun Management Center software is a scalable, SNMP-based platform for managing Sun servers. The most advanced systems management solution from Sun to date, Sun Management Center software offers a single point of management for all Sun servers, desktops, storage systems, the Solaris Operating Environment, applications, and data center services.

Sun Management Center software lets customers scale from management of a single system to thousands of systems on a single, unified management platform. And it integrates easily with leading third-party platforms for added flexibility.

With predictive failure reporting and comprehensive event and alarm management, Sun Management Center software warns customers of potential problems so they can solve them before they cause downtime. Sun Management Center

software simplifies the management of their Sun environment, so customers can use their administration staff and technical resources more efficiently and help reduce the cost of delivering network services.

Sun Management Center software enables administrators to spend more time optimizing service delivery, less time dealing with management complexity. For example, Sun Management Center software provides remote online control, so administrators can work from virtually anywhere. “No cease” management provides uninterrupted monitoring while new features are added or existing features are reconfigured. And built-in security enables multiple administrators with different responsibilities to manage the environment.

Sun Management Center software provides real-time system performance and configuration data, enabling administrators to isolate bottlenecks. It even provides optional centralized data storage and performance analysis, including historical trend analysis.

Sun Management Center software delivers everything administrators need to perform Remote System Configuration on systems with Dynamic Reconfiguration enabled, monitor performance, and isolate hardware and software faults—all through an easy-to-use Java technology interface. It provides:

- A single point of management, enabling administrative resources to be used more effectively
- Active configuration management controls, providing a secure interface for remote dynamic reconfiguration capabilities and helping to ensure availability
- A single event model, enabling information to be shared with multiple consoles or users with ease
- Multiple system support, enables administrators to monitor/manage all Solaris Operating Environment systems remotely
- Predictive failure analysis, enabling administrators to predict potential failures before they occur
- Health monitoring, along with suggested steps for problem resolution, resulting in simplified administration
- Logical element grouping, enabling Sun systems to be grouped by geographical location, server role, administrative responsibility, among others.
- A comprehensive topology map, providing a high-level view of all the objects that are being managed, along with hierarchies
- Automatic discovery of Sun systems, including IP address, subnet address, hostnames, and more
- Event and alarm management, providing administrators with the information they need when they need it
- Enterprise-wide security measures, such as authentication, data integrity, and access control lists for management of data and active management functions
- Standard interfaces and protocols, enabling integration with third-party management tools, including Tivoli, Computer Associates, and BMC
- A Java technology interface, providing heterogeneous GUI support, a common look and feel for all Sun Management Center applications, and the flexibility to manage the enterprise from any platform using Java technology

SunScreen Secure Net Software

SunScreen Secure Net software is a bundled solution which includes SunScreen EFS™ and SunScreen SKIP software. It enables users to establish a secure business network. SunScreen Secure Net software is a comprehensive security solution (including one of the industry’s fastest firewalls) that builds on the power of the Solaris Operating Environment.

The customer can configure SunScreen Secure Net software to be a stealth box like the current SunScreen SPF-200 software, including hardening the operating system. Or the customer could select a few interfaces to be stealth and elect for other interfaces to be SunScreen EFS software interfaces, thereby allowing for functionality such as proxies. This gives SunScreen Secure Net software a unique capability of using stealth when connecting to untrusted networks (for example, the Internet), while providing added functionality of proxies in other interfaces.

SunScreen SPF-200 Software

SunScreen SPF-200 software is Sun's strongest platform for perimeter defense, providing secure business operations over the Internet. SunScreen SPF-200 software uses a stealth design to prevent attack and state-of-the-art SunScreen SKIP encryption to protect data going over the network. SunScreen SPF software's advanced dynamic packet filtering coupled with Sun's high-speed hardware is designed to meet the most demanding performance requirements.

SunScreen EFS software was rated the fastest firewall in a recent Data Communications performance test that included the top firewall vendors. Given SunScreen SPF software's internal design and optimization, SPF should run even faster. The performance of SunScreen SPF software enables it to keep up with the demands required to screen large amounts of Internet traffic.

The stealth design, which makes SunScreen SPF software not addressable with an IP address, provides two benefits. The stealthing makes SunScreen SPF software more secure as potential intruders can not address the machine running SunScreen SPF-200 software. Also, installation of SunScreen SPF software into the network is easy, since the administrator can install it without changing routing tables.

The stealth design "hardens" the operating system and turns the system into a dedicated SunScreen SPF software system that only runs SunScreen SPF-200 software. Hardening the operating system enhances security since other applications do not run on the system, there is less exposure. SunScreen SPF software uses a separate administration station that can be any SPARC machine and need not be dedicated. State-of-the-art SunScreen SKIP encryption technology provides secure network communication and acts as the infrastructure for electronic commerce, Extranets, and secure remote access. SunScreen SKIP software protects the data being transmitted, helps ensure its integrity, and provides a high level of authentication.

SunScreen SPF software covers both TCP and UDP services. SunScreen SPF software keeps track of the sequence of events that occur with a UDP service even though UDP is in fact a stateless protocol. This is done to improve security and performance.

SunScreen SPF software allows flexibility in logging what has passed or failed through the screen. Administrators can choose what they want to monitor and also be alerted to problems through alerts to network management stations.

To provide additional protection of the internal network, network address translation (NAT) converts internal address to a different set of public addresses. This also helps those customers that didn't formally register internal host IP addresses. NAT supports both static and dynamic translation of internal addresses to public addresses. Since hackers do not know internal addresses of hosts, attacks are minimized.

Administration is done through secured remote administration stations, enhancing security, and meeting the needs of organizations for remote management.

VERITAS NetBackup Software

VERITAS NetBackup software provides high-performance, industrial-strength backup, archive, recovery and space management services for UNIX and PC clients in the large enterprise. With high-speed backup of large databases, centralized management capabilities, mainframe-class media management, and support for high-end tape drives and robotics, VERITAS NetBackup software is specially geared for the large data center customer.

VERITAS NetBackup software cost-effectively automates backup and recovery for thousands of nodes across multiple servers, while enabling the enterprise to manage its storage from a single console. With optional add-on modules, VERITAS NetBackup software provides high-performance hot or cold database backup, as well as archive capabilities that allow the enterprise to effectively manage data that is rarely accessed yet requires long-term storage. VERITAS NetBackup software features sophisticated media and device management capable of managing media across the enterprise from a single location, and enabling sharing of tape robotics hardware with other applications.

Sun StorEdge Instant Image Software

Sun StorEdge Instant Image software is a point-in-time copy facility which runs on a Solaris Operating Environment application or storage server. Instant Image will enhance the ability of businesses to achieve non-stop business

processing by capturing frequent snapshots of live data for independent read and write purposes. Sun StorEdge Instant Image software enables point-in-time copies, or shadow volumes, to be created on a Sun storage system. A shadow volume is a replicated view of data which has been frozen at a specific point in time and is used to enable a secondary application to non-disruptively access a primary application's data. Product applications include the following:

- **Backups -** Enable on-line processing to continue while backup processes backup a point-in-time snapshot image of on-line data
- **Data warehouse loading -** Populate a data warehouse from a snapshot image of on-line data
- **Application development and testing -** Make a snapshot image of production data available as test data for new applications
- **Data migration -** Use Sun StorEdge Instant Image software to help migrate from one storage platform to another

VERITAS Volume Manager (VxVM) Software

VERITAS Volume Manager (VxVM) software provides easy-to-use on-line disk storage management for enterprise computing environments. Traditional disk storage management is a labor intensive process often requiring machines to be taken off-line—a major inconvenience to users. Once the system is off-line, the system administrator is faced with the tedious process of backing up existing data, manually changing system parameters, and reloading the data. In today's distributed client/server environments, users are demanding that databases and other resources be available 24 hours a day, are easy to access and are safe from corruption or loss caused by hardware malfunction.

VxVM software provides system administrators with the tools to dynamically configure disk storage, to perform administrative tasks while the system is active, and to analyze disk usage.

VxVM software provides on-line administration of disk resources so that the disk subsystems can be managed without interrupting users or applications. Disk spanning helps eliminate media size limitations and allows load balancing and extension of file systems and databases. Disk mirroring increases data availability in the case of disk failures. It also provides a hot relocation algorithm, allowing subdisks to be relocated from a failing disk.

VxVM software provides disk striping and RAID features to increase I/O throughput and fault tolerance. It provides support for performance monitoring, and flexible allocation of free space for application load balancing.

Veritas Volume Manager software actively supports multiported disk arrays. It automatically recognizes multiple I/O paths to a particular disk device within the disk array. The dynamic multipathing (DMP) feature provides greater reliability by providing a path failover mechanism. In the event of a loss of one connection to a disk, the system continues to access the critical data over the alternate connection to the disk. The multipathing functionality also provides greater I/O throughput by balancing the I/O load uniformly across multiple I/O paths to the disk device.

VxVM software provides an easy-to-use graphical administrative interface, providing the ability to quickly create disk configurations, reducing administrative costs. It also presents a logical pool of free space which can be automatically or directly allocated. The on-line architecture allows the partitioning of arbitrary areas on a disk, and the creation of sparse non-contiguous mirrors, enabling the replication of critical disk areas.

SunVTS Software

The Sun Validation Test Suite, or SunVTS software, is an online diagnostics tool and system exerciser for verifying the configuration and functionality of Sun hardware controllers, devices, and platforms. SunVTS software is standard on the Solaris Supplemental CDROM.

Customers can run SunVTS software using any of these interfaces: a command line interface, a terminal interface, or a graphical interface that runs within a windowed desktop environment.

SunVTS software lets customers view and control a testing session over modem lines or over a network. Using a remote system, customers can view the progress of a SunVTS testing session, change testing options, and control all testing features of another system on the network.

The SunVTS system exerciser is a graphically oriented UNIX application that permits the continuous exercising of system resources and internal and external peripheral equipment. Used to determine if the system is functioning properly, SunVTS software incorporates a multifunctional stress test of the system through operating-system-level calls, and allows the addition of new tests as they become available.

VERITAS File System Software

VERITAS File System (VxFS) software is a high-performance, quick-recovery file system. VxFS software augments UNIX file management with high availability, increased bandwidth, and up-to-date and reliable structural integrity. It provides scalable performance and capacity to meet the demands of increased user loads and client/server environments.

VxFS software provides fast recovery following a system crash or reboot. The system completes a file system check (fsck) in seconds, regardless of file system size. In addition, VxFS software supports on-line backup, on-line resizing (shrinking and growing of a file system), and on-line defragmentation. These capabilities allow administrators to respond to dynamic data capacity and performance requirements while reducing scheduled maintenance interruptions.

VxFS software allocates disk space to files in large, contiguous areas called extents, rather than in small fixed-size blocks. This results in a significant reduction in the number of I/O operations required to read and write large amounts of data.

Performance Benchmarks -Reference

Benchmark information will be provided as it becomes available.

Standard Configurations – Preconfigured Systems

Standard configurations are a means to offer popularly configured systems. These systems insure a functional base system via a single line item for the convenience of customers, sales, and operation/manufacturing.

Three Sun Fire™ V440 server Standard Configurations and one bundled configuration with the Sun StorEdge 3310 will be offered.

Marketing Part Number	Configuration Description
A42-XAB2-04GD	Sun Fire™ V440 server with 2 CPUs at 1.062 Ghz, 4 GB memory implemented as (8 x 512MB), 4 - 36 GB, 1.0", 10,000 RPM, Ultra320 SCSI disks Also includes: • A four post rackmount kit with cable management arm • DVD IDE drive • ALOM system management module (serial, network) • SCC, System Configuration Card • Two 680W power supplies, providing 1+1 redundancy • Two integrated 10/100/1000 Mb/s Ethernet ports • 1 DB-9 serial port • 4 USB ports, i.e. for optional keyboard and mouse • Solaris™ server license - Solaris™ 8 (HW 07/03) or later • 3-year, second-day, on-site hardware warranty
A42-XAB4-08GD	Sun Fire™ V440 server with 4 CPUs at 1.062 Ghz, 8 GB memory implemented as (16 x 512MB), 4 - 36 GB, 1.0", 10,000 RPM, Ultra320 SCSI disks Also includes: • A four post rackmount kit with cable management arm • DVD IDE drive • ALOM system management module (serial, network) • SCC, System Configuration Card • Two 680W power supplies, providing 1+1 redundancy • Two integrated 10/100/1000 Mb/s Ethernet ports • 1 DB-9 serial port • 4 USB ports, i.e. for optional keyboard and mouse • Solaris™ server license - Solaris™ 8 (HW 07/03) or later • 3-year, second-day, on-site hardware warranty

A42-XCB4-16GD	Sun Fire™ V440 server with 4 CPUs at 1.28 Ghz, 16 GB memory implemented as (16 x 1GB), 4 - 36 GB, 1.0", 10,000 RPM, Ultra320 SCSI disks Also includes: • A four post rackmount kit with cable management arm • DVD IDE drive • ALOM system management module (serial, network) • SCC, System Configuration Card • Two 680W power supplies, providing 1+1 redundancy • Two integrated 10/100/1000 Mb/s Ethernet ports • 1 DB-9 serial port • 4 USB ports, i.e. for optional keyboard and mouse • Solaris™ server license - Solaris™ 8 (HW 07/03) or later • 3-year, second-day, on-site hardware warranty

For details regarding the specific warranty for each Sun product, please refer to the Sun Warranty Web Page at:

http://www.sun.com/service/support/warranty/

Assemble to Order(ATO)

Assemble to order configurations are not available. The three preconfigured systems greatly reduce the requirement for custom configurations which generally command a premium in pricing.

Expandability to Processors and Memory

All systems fully utilize the available memory DIMM slots. Therefore, when one selects the:

- A42-XAB2-04GD - 2 processor, 4 GB, 4 disks system

the maximum system configuration that can be achieved without a CPU/Memory module exchange is a 4 processor, 8 GB system. This configuration may be obtained by adding two of the (X)7415A options as shown below:

Configuration	Description	Maximum Number of Additional Modules Possible
A42-XAB2-04GD	2 x 1.062GHz processor, 4 GB, 4 disks	2 (X7415A, 1x1.062GHz/2GB)

- For tradeins and exchanges of faster processor speeds or increased memory capacity, contact IBB for available memory upgrade/exchange programs. Also, please see “Sun Upgrade Allowance Program” on Page 56 for more information regarding exchanges of CPU/Memory modules.

It is encouraged that one carefully consider the growth potential, application and budget constraints when selecting the system. Classic applications such as database and CAE can generally take advantage of large memory and the fully configured system may be appropriate.

The maximum memory capacity for the Sun Fire™ V440 server is 16GB.

Storage Configuration Guidelines

Host Bus Adapters

X6729A PCI to FC-AL Adapter

The X6729A is not supported with UltraSPARC IIIi systems. This adapter utilizes the Qlogic 2100 series chip which as since been superseded by the Qlogic 2200 series. The IFP driver support for this device does not provide all of the features, especially failover capabilities, that are available with the leadville driver and the Qlogic 2200 implementation. Limited resources and emphasis on higher availability preclude maintaining both devices.

Note: For similar reasons, the X2069A, combination Gigabit Ethernet and FC-AL controller, which utilizes the Qlogic 2100 series chip is also not supported on UltraSPARC IIIi systems.

X6799A PCI to Single FC-AL Adapter

This adapter was originally introduced to provide connectivity to external FC-AL storage arrays for the Sun Fire 280R. This product is available for use on all currently available UltraSPARC II, III and IIIi based systems. The product provides a single FC-AL loop and no internal connector. For applications with multiple external FC-AL storage arrays and/or loops, the X6727A is preferable as it will conserve PCI slots.

Storage Configurations and Support

Network Storage is responsible for defining and supporting the configurations of host bus adapters and external storage arrays in combination with drivers and storage management tools regardless whether the arrays utilize SCSI or FC technology. These same components will influence the functionality available for the internal storage array as well.

FC-AL loops

Supported configurations require that individual FC-AL loops are connected only to a single type of array. However, individual loops of a multi-loop controller i.e. X6727A, PCI to dual FC-AL controller, may be connected to different types of arrays provided that all arrays on any individual loop are the same.

Multipathing and Benefits

Multipathing provides two independent hardware connections to a disk or an array, whether internal or external. The primary objective is to maintain accessibility to data even in the event of a hardware failure of the controller or cabling, etc. Multipathing may offer higher throughput and bandwidth to the disk array, but generally this is considered as a secondary advantage.

Within a storage logical unit, RAID techniques may be applied for the purpose of masking the failure of an individual disk. Typically, RAID 5, striping with distributed parity, is more effective than RAID 1, mirroring or complete, duplicate copies.

Multipathing to the Internal Storage Array

Not available, however, the internal dual channel controller, an LSI 1030 chip offers the ability for HW mirroring.

Multipathing to External Arrays (with dual channel controller)

When implementing multipathing to external arrays with the dual channel internal controller, one channel is dedicated to the external SCSI connector. In most cases, the second path may be utilized via the X6758A Dual Channel LVD Ultra160 SCSI Host Bus Adapter. However, the Sun StorEdge 3310 JBOD requires two X6758A HBA's since the external SCSI port is not a supported configuration with this storage device. Support through the external SCSI port for the Sun StorEdge 3310 JBOD is expected in late 2003.

Software Requirements to Implement Multipathing

In order for multipathing to be transparent to applications, an intermediate software level is required to provide a layer of abstraction between the applications and the physical connectivity to the storage subsystem. This layer can mask the failure of an individual loop from the application and redirect the I/O over the alternate path. All applications referencing the abstraction layer pick up the failover capability without having to deploy specific code for path selection and recovery.

Important: If multipathing to an external array is desired, a software manager such as Veritas Volume Manager with Dynamic Multipathing is required. Failure to utilize a volume manager may result in the inadvertent corruption of the volume structure and/or content resulting from the unsynchronized access via two independent paths to the same physical device. To insure data integrity, Veritas Volume Manager with Dynamic Multipathing must be implemented for multipathing to the external array. Failure to do so will render the configuration unsupported. However, a second alternative is to utilize the Solaris 8 Multiplexing feature. An unbundled enhancement after Solaris 8 7/01 referred to as Multiplexing I/O (MPxIO) will provide multipathing to external arrays, the Sun StorEdge A5x00 and Sun StorEdge T3 arrays via the X6799 or X6727 PCI adapters. However, this version will not offer support for the FC-AL loops upon which the boot device resides, i.e. most likely the internal storage array. That functionality is planned for a subsequent version until which time, Veritas Volume Manager with Dynamic Multipathing is required.

RAID Implementation

The Sun Fire™ V440 server offers RAID 1 Hardware Mirroring of the 4 internal Ultra320 SCSI disk drives via the internal, dual channel LSI 1030 controller. Hardware RAID 1 is an attractive enhancement that can boost overall I/O throughput and performance as well as create a mirrored image of the internal drives for redundancy.

Software RAID may also be implemented on the internal storage array by either Solstice Disk Suite or Veritas Volume Manager with Dynamic Multipathing. The Sun Fire™ V440 server requires a departmental, Tier 1 license for Veritas Volume Manager.

Solistic Disk Suite is licensed with Solaris and provides:

- RAID 0 - Striping
- RAID 1 - Mirroring
- RAID 1+0 - Mirroring plus Striping
- RAID 5 - Striping with Distributed Parity
- Dynamic File System Expansion
- UNIX File System Logging
- Hot Disk Sparing

Information is available under Solaris of which Solstice Disk Suite is a component.

Veritas Volume Manager with Dynamic Multipathing is licensed separately and provides:

- RAID 0 - Striping
- RAID 1 - Mirroring
- RAID 0+1 - Striping plus Mirroring
- RAID 1+0 - Mirroring plus Striping
- RAID 5 - Striping with Distributed Parity
- UNIX File System Logging provided separately by Veritas File System
- Hot Disk Sparing

USB Ports and Devices

The system contains four USB 1.0a ports.

Supported Options

Note: The prefix X indicates availability strictly as a field installable option.

Order Number	Option Description	Maximum Number Supported per System	Comments
Processor/Memory Modules			
X7415A	1.062 GHz UltraSPARC IIIi processor/memory module, processor with 1 MB internal (L2) cache, 2GB DDR1 (4 x 512MB) of memory included.	4	
X7416A	1.28 GHz UltraSPARC IIIi processor/memory module, processor with 1 MB internal (L2) cache, 4GB DDR1 (4 x 1 GB) of memory included.	4	
Memory			
X7403A	1 GB (2 DIMMs of 512 MB each)	8 Sets (4 DIMMs per module available as 2 Pairs per module)	
X7404A	2 GB (2 DIMMs of 1 GB each)	8 Sets (4 DIMMs per module available as 2 Pairs per module)	
Internal Storage Devices			
X5261A	36 GB, 1.0", 10,000 RPM, Ultra320 SCSI 320 MB/sec	4	
X5264A	73 GB, 1.0", 10,000 RPM, Ultra320 SCSI 320 MB/sec	4	
External Storage Interfaces			
Sun Fire TM V440 server has 6 full-size PCI expansion slots: • *3 slots@64bit/33Mhz* • *3 slots@64bit/66Mhz* *The total power consumption by PCI should not exceed 90W.*			
PCI SCSI Adapters			
X6540A	Dual channel Single-ended Ultra/Wide SCSI PCI Adapter	4	
X6541A	Dual channel Differential Ultra/Wide SCSI PCI Adapter	4	
X6758A	Dual Channel LVD Ultra160 SCSI HBA (Jasper) Jasper LVD 160MB/sec HBA	4	
PCI Fibre Channel Adapters			

X6768A	Sun Dual Loop PCI FC-AL 2GB host adapter (Crystal 2-A) (GA June/July 02)	4	
X6799A	Sun Single Loop PCI FC-AL Host Adapter (Amber)	4	
X6767A	Sun 2GB Single Fibre Channel Network Adapter (Amber2)	4	
X6727A	Sun Dual Loop PCI FC-AL Host Adapter (Crystal+) when released	4	
SG-XPCI1FC-JF2	**JNI 2Gb PCI Single FC HBA w SFK (Amber 2J)**	**2**	
SG-XPCI2FC-JF2	**JNI 2Gb PCI Dual FC HBA w SFK (Crystal 2J)**	**2**	
	NOTE: The (X)6729A - PCI to single FC-AL controller is not supported in UltraSPARC IIIi systems		
Network Interfaces			
	PCI Serial Adapters		
X1155A	Sun HSI/P high-speed serial interface, PCI	4	
X2156A	Sun SAI/P serial asynchronous interface, PCI	4	
P-0005	Mfg: Antares, Asychronous serial/modem, PCI	2	
P-0002	Mfg: Antares, PCI SE-2 dual serial comm	2	
	PCI Ethernet Adapters		
X1033A **(EOL Q2FY03)**		6	
X1034A	10/100 Base T Quad Fast Ethernet PCI Adapter	4	
X1141A	Gigabit Ethernet PCI Adapter	2	
X1150A	Sun Gigabit Ethernet-Cat5 (copper) PCI66 adapter	2	
X1151A	Sun Gigaswift Ethernet PCI adapter (Fiber)	2	
X4444A **(March 04)**	QGE (GA March 04) **Support expected**	2	
	PCI to ATM Adapters		
X1157A **(EOL Q4FY04)**	Sun ATM-155/MMF 4.0/5.0 PCI66 bus adapter	4	
X1158A **(EOL Q4FY04)**	Sun ATM-155/UTP 4.0/5.0 PCI66 bus adapter	4	
X1159A **(EOL Q4FY04)**	Sun ATM-155/P622 MMF 4.0/ 5.0 PCI66 bus adapter	3	
	PCI Combination Adapters		
X1032A	PCI to 10/100 Base T plus Single-ended Ultra/Wide SCSI adapter	6	
X2222A	Dual Fast Ethernet + Dual SCSI PCI Adapter	2	
	Note: The (X)2069A Gigabit Ethernet plus FC-AL is not supported in UltraSPARC IIIi systems		
	PCI Interoperability		
X2132A	SunPCi Co-Processor with 733MHz Celeron CPU	3	
X1074A	Sun/PCI Card (SunCluster Interconnect)	2	
X2134A	Sun/PCI3	2	
	PCI Encryption		
X6762A	Crypto Accelorator 1000 (Deimos)	2	
X4011A	Venus Encryption Card (Copper) POST RR	1	
X4012A	Venus Encryption Card (Fibre) POST RR	1	

PCI Video and Graphics Adapters			
X3768A **(EOL'd Q3FY03)**		2	
X3769A	XVR-100 (Papaya)	2	
X3685A	XVR-500 graphics PCI adapter (IFB Lite+)	2	
X3780A **(GA Q2FY04)**	XVR-600 (IFB3 Lite) **NOTE: Post GA support planned. Not supported in Solaris 8 HW 07/03 but drivers may be available for download separately.**	2	
X3689A	XVR-1200 (IFB3)	2	
Power Cords			
X311L	Power Cord Kit, U.S./Asia	2	
X312L	Power Cord Kit, Continental Europe	2	
X386L	Power Cord Kit, Australia	2	
X317L	Power Cord Kit, U.K.	2	
X314L	Power Cord Kit, Switzerland	2	
X384L	Power Cord Kit, Italy	2	
X383L	Power Cord Kit, Denmark	2	
530-3096-01	Power Cord Jumper, extends any geography specific power cord	2	
	Note: One power cord required per power supply. Two required per system.		
Other Options			
	Rackmount Kit		
X7417A	Two Post Rackmount kit	1	
	Video Monitors		
X7147A	17-inch entry color monitor		
X7137A	18.1" TFT LCD Color Monitor		
X7146A	21-inch color monitor, 19.8 inch v.a.		
	Note: The following have been retired but are supported for PGX32 and PGX64. X1703A - 17-inch entry color monitor X7119A - 19-inch color monitor X7121A - 21-inch color monitor		
	SCSI Cables and Adapters		
X1139A	2-meter, cable, SCSI 68-pin, Ultra SCSI (supports PCI host bus adapter, P/N X1032A - 10/100BASE-T, F/W UltraSCSI)		StorEdge D240
X3830A	4-meter cable, SCSI 68-pin to VHDC (supports Compact PCI host bus adapter P/N X1232A - 10/100BASE-T, F/W UltraSCSI)		StorEdge D240, 2310 & 1310
X3831A	HD68 to VHDCI68 with Ferrites, 10m		StorEdge 2310/1310
X3832A	HD68 to VHDCI68 with Ferrites, 2m		
X3835A	HD68M to 2xHD68F, 30cm (Y-cable)		

X1136A	Cable, SCSI, VHDCI/VHDCI, 0.8m		StorEdge 2310/1310
X1137A	Cable, SCSI, VHDCI/VHDCI, 1.2m		StorEdge 2310/1310
X1138A	Cable, SCSI, VHDCI/VHDCI, 2m		StorEdge 2310/1310
X3856A	HD68 to HD68 with Ferrites, 80m[1]		
X3810A	HD68 to HD68 with Ferrites, 4m		
X3838A	HD68 to HD68 with Ferrites, 6m		
X3839A	HD68 to HD68 with Ferrites, 8m		
X905A	HD68 ti HD68, 1m		
530-2224	HD68 to HD68 with Ferrites, 1m		
X902A	HD68 to HD68 with Ferrites, 2m		
530-1883	HD68 ti HD68, 20cm		
X977A	HD68 ti HD68, 25cm		
X901A	HD68 to HD68 with Ferrites, 80cm		
X979A	HD68 ti HD68, 12m		
530-2375	HD68 to HD68 with Ferrites, 12m		
530-2452	HD68 to VHDCI68 with Ferrites, 80cm[1]		
X991A	90° HD68 to 90 ° HD68, 16cm[1]		
X992A	Left 90° HD68 to 90 ° VHDCI68, 2m[1]		
X993A	Left 90° HD68 to 90 ° VHDCI68, 4m		
370-3545	L1000 90° HD68 to 90 ° HD68, 18cm		
370-3456	L1000 90° HD68 to 90 ° HD68, 36cm[1]		
	Fibre Cables		
X973A	Fiber Optic Cable, 2m		
X978A	Fiber Optic Cable, 15m		
X9732A	2M LC to LC Fibre Optical Cable (Minnow 2U FC)		
X9733A	5M LC to LC Fibre Optical Cable (Minnow 2U FC)		
X9734A	15M LC to LC Fibre Optical Cable (Minnow 2U FC)		
X9721A	0.4 meter LC to SC Fibre Channel Optic Cable		
X9722A	2.0 meter LC to SC Fibre Channel Optic Cable		
X9723A	5.0 meter LC to SC Fibre Channel Optic Cable		
X9724A	15 meter LC to SC Fibre Channel Optic Cable		
	Racks		
SG-XARY030A	72-inch Sun StorEdge expansion cabinet (deLorean Rack)		
SF-XCAB	Sun Fire Expansion Rack (Serengeti)		
SR9-XKL038A	Sun Rack 900		

Additional PCI Adapters

Other PCI adapters, including those for ATM, FDDI and Token Ring are available from:

I/O Technologies Group, http://www.sun.com/io/

Unsupported PCI Adapters

The following is a partial listing of some of the recent PCI adapters that are not supported on the Sun Fire™ V440 server.

Part Number	***Description***	***Reason/Comments***
X6729A	PCI to single FC-AL	Retired, replaced by X6799A, X6727A
X2069A	FCAL plus 1 Gbit Ethernet	Uses older Qlogic 2100 series chip
X1152A/X1153A	PCI to FDDI	Retired, no longer produced
X1154A	PCI to Token Ring	Retired, no longer produced
X1156A	Serial interface	Retired, replaced by X2156A
X6542A	SCSI RAID Controller	Not supported, approaching retirement
X4810A	PCI to OC-48 Packet over Sonet Adapter(Apollo)	Retired, not supported

External Options

The following external storage devices and arrays are supported. Please refer to Network Storage configuration guidelines for specific details.

Disk Arrays

- Sun StorEdge 3310 SCSI **(Support is available via the X6758A Ultra3 SCSI HBA)**
- Sun StorEdge 3310 NAS
- Sun StorEdge 3120 **(Support expected Post GA)**
- Sun StorEdge 3510
- Sun StorEdge A1000/D1000 **(Differential SCSI not supported via Sun Fire V440 external LVD SCSI connector, HBA required.)**
- Sun StorEdge D240
- Sun StorEdge T3 enterprise array
- Sun StorEdge T3 workgroup array
- Sun StorEdge D2
- Sun StorEdge S1
- Sun StorEdge 6120/6320 **(Post GA – Targeted for 12/03)**
- Sun StorEdge 3900 **(Post GA – Targeted for 12/03)**
- Sun StorEdge 6900 **(Post GA – Targeted for 12/03)**
- Sun StorEdge 9900 **(Post GA – Targeted for 12/03)**

Tape Drives and Tape Automation

Current:

- Sun StorEdge 4mm DDS-4 Unipack
- Sun StorEdge SDLT 320 Desktop Tape Drive
- Sun StorEdge LTO 2 Desktop Tape Drive **(Not supported via Sun Fire V440 external SCSI connector. Requires X6758A Ultra3 SCSI HBA)**
- Sun StorEdge L8 Tape Autoloader **(Not supported via Sun Fire V440 external SCSI connector. Requires X6758A Ultra3 SCSI HBA)**
- Sun StorEdge L9 Tape Autoloader **(Not supported via Sun Fire V440 external SCSI connector. Requires X6758A Ultra3 SCSI HBA)**
- Sun StorEdge L25-LVD versions **(Not supported via Sun Fire V440 external SCSI connector. Requires X6758A Ultra3 SCSI HBA)**
- Sun StorEdge L100-LVD versions **(Not supported via Sun Fire V440 external SCSI connector. Requires X6758A Ultra3 SCSI HBA)**

Transitioned:

Sun StorEdge DLT8000 Flexipack

Sun StorEdge SDLT 220 Desktop Tape Drive

Sun StorEdge L7 Tape Autoloader

Tape Library Calculator
http://rmqual.ebay/TLC/TLC.html

Tape Automation Products At-A-Glance
http://webhome.ebay/networkstorage/products/tape_automation/index.html

Upgrades

Sun Upgrade Advantage Program (UAP)

The Sun Fire™ V440 server is the newest member of Sun's powerful generation of Volume servers for enterprise network computing based upon the UltraSPARC IIIi microprocessor technology.

From branch office or data center, Sun provides upgrade solutions customers can count on to maximize their investment. The Sun Upgrade Advantage program allows customers to receive a fair trade-in allowance towards the purchase of a 4-way Sun Fire™ V440 server.

Sun UAP simplifies the upgrades process by providing a trade-in value as a percentage allowance. This percentage allowance is applied to the list price of a new 4 way Sun Fire™ V440 system configuration.

Upgrades to the Sun Fire™ V440 server are available as a full system swap. Customers can upgrade from an Ultra 5s, 10s, Enterprise 2, Enterprise 250, Enterprise 220R, Enterprise 450, Enterprise 420R, and Sun Fire 280R to the new Sun Fire™ V440 server. However, components such as CPUs, memory and drives cannot migrate from UltraSPARC II or UltraSPARC III systems. Sun Fire™ V440 uses UltraSPARC IIIi technology. Memory components such as the 512 MB and 1 GB memory options can migrate from UltraSPARC IIIi systems like the Sun Fire V210 and Sun Fire V240.

Systems being upgraded must be owned by, used by, and in the possession of the customer at least ninety (90) days prior to upgrading. To qualify for the upgrade allowance, customers must return within 90 days, a bootable working system.

Key Messages

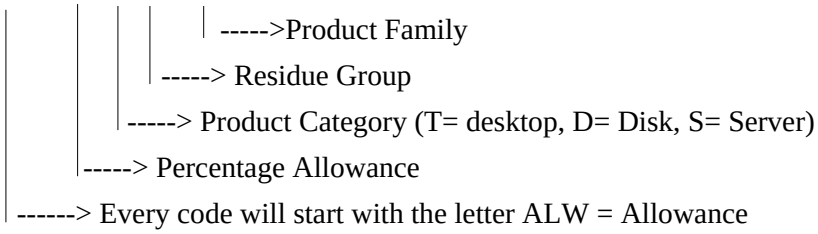
- The Sun Fire™ V440 Server is available in standard (fixed) configurations.
- The Sun Fire™ V440 Server helps complete Sun's end-to-end architecture value chain that consists of low priced, horizontal scaling machines to massive vertical scaling machines.
- As the new four-way server within the server product line, the Sun Fire™ V440 will meet the needs of customers who desire compute intensive servers. It offers scalability, new technologies that improve speed, and PCI slots for connecting to external storage. Because of its low cost, high performance, dense packaging and memory scalability, a group of Sun Fire™ V440 servers can be utilized to perfrom multiple specialized tasks, eliminating the burden of attempting to use a large enterprise server for multiple tasks.
- Hot pluggable components such as disks and power supplies help maximize system availability by allowing maintenance and upgrades to occur during normal operations.
- Existing investments in non-Sun hardware can be preserved by upgrading to Sun through competitive full-system upgrades.
- Multiple Sun or non-Sun hardware can be upgraded to a new Sun server by way of the server consolidation program.

How To Order

An allowance code is used when upgrading to a Sun Fire™ V440 server. Volume server Sun UAP product matrices containing standard upgrade allowance codes are included in the Sun Configuration guide. The Sun UAP matrices provide instructions for using codes.

Allowance Code Numbering Scheme

Standard Allowance Code ALW-**TBD**-S-**L**-A42


------>Product Family
-----> Residue Group
-----> Product Category (T= desktop, D= Disk, S= Server)
-----> Percentage Allowance
------> Every code will start with the letter ALW = Allowance

To determine the upgrade allowance value, apply the allowance code percentage to the list price of a 4 way Sun Fire™ V440 server. This allowance is in addition to any contracted discounts that the customer may be eligible for.

Customers will need to return a full functioning system within 90 days of receipt of the hardware. RMA kits (UG-RMA) must be ordered with each allowance code. UG-RMA kits provides customers instructions on where to return the used (residual) equipment. Customers will be billed for all non returned equipment.

Upgrade Paths

Sun Upgrade Advantage Program (UAP)

	Upgrade From	**Upgrade To**	**Allowance Code Part Number**	**Return**
Sun Servers				
	Ultra 5s, 10s Enterprise 2, Enterprise 250, Enterprise 220R Enterprise 450, Enterprise 420R or Sun Fire 280R	Sun Fire™ V440 (4 way systems only)	See Worldwide Configuration Guide or Sun Win #94711 and Sun Win #96194 for standard trade -in allowances	A full functioning system
CPU/Memory Modules				
Available up to 4 total	1.062 GHz UltraSPARC IIIi processor/memory module, processor with 1 MB internal (L2) cache, 2GB ((X)7403A = 4 x 512MB) of memory included.	1.28 GHz UltraSPARC IIIi processor/memory module, processor with 1 MB internal (L2) cache, 4GB ((X)7404A = 4 x 1 GB) of memory included.	See Worldwide Configuration Guide or Sun Win #108142 for standard trade -in allowances	A full functioning, 1.062 GHz UltraSPARC IIIi processor/memory module.
Memory				
Available for each CPU module up to 4 total groups of 4 DIMMs	2GB 4*512MB DIMM (2*X7403A)	4GB configured as 4x1GB DIMM (2*X7404A)	See Worldwide Configuration Guide or Sun Win #108142 for standard trade -in allowances	Functional, 2GB configured as 4*512MB DIMM (2*X7403A)

Memory Configurations:

Please refer to details under the Section entitled *Ordering Information.*

Software Upgrade Ordering

Order Number	Title and Description
SNM-SM-2.2.3-P	Solstice Site Manager • 2.2.3 CD, Install Doc, User Guide, single system license. Right to manage for 100 nodes in the network Solstice Cooperative Consoles 1.1 Sender.
SNM-NM-2.2.3-P	Solstice SunNet Manager • 2.2.3 CD, Install Doc, User Guide, singe system license. Right to manage unlimited number of nodes in the network. Solstice Cooperative Consoles 1.1 Sender

The SunSpectrum[SM] program is an innovative and flexible service offering that allows customers to choose the level of service best suited to their needs, ranging from mission-critical support for maximum solution availability to backup assistance for self-support customers. The SunSpectrum program provides a simple pricing structure in which a single fee covers support for an entire system, including related hardware and peripherals, the Solaris[TM] Operating Environment software, and telephone support for Sun[TM] software packages. The majority of Sun's customers today take advantage of the SunSpectrum program, underscoring the value that it represents. Customers should check with their local Sun Enterprise Services representatives for program and feature availability in their areas.

FEATURE	SUNSPECTRUM PLATINUM[SM] Mission-critical Support	SUNSPECTRUM GOLD[SM] Business-critical Support	SUNSPECTRUM SILVER[SM] Systems Support	SUNSPECTRUM BRONZE[SM] Self Support
Systems Features				
Systems approach coverage	Yes	Yes	Yes	Yes
System availability guarantee	Customized	No	No	No
Account Support Features				
Service account management team	Yes	No	No	No
Local customer support management	No	Yes	No	No
Personal technical account support	Yes	Yes	Option	No
ServerStart	No	No	No	No
Account support plan	Yes	Yes	No	No
Software release planning	Yes	No	No	No
On-site account reviews	Monthly	Semiannual	No	No
Skills assessment	Yes	No	No	No
Site activity log	Yes	Yes	No	No
Coverage / Response Time				
Standard telephone coverage hours	7 day/24 hour	7 day/24 hour	8 a.m.–8 p.m., Monday–Friday	8 a.m.–5 p.m., Monday–Friday
Standard on-site coverage hours	7 day/24 hour	8 a.m.–8 p.m., Monday–Friday	8 a.m.–5 p.m., Monday–Friday	N/A
7-day/24-hour telephone coverage	Yes	Yes	Option	Option
7-day/24-hour on-site coverage	Yes	Option	Option	N/A
7-day/12-hour on-site coverage	No	Option	No	No
5-day/24-hour on-site coverage	No	Option	No	No
Coverage / Response Time (cont.)				
Customer-defined priority setting	Yes	Yes	Yes	Option

FEATURE	SUNSPECTRUM PLATINUM[SM] Mission-critical Support	SUNSPECTRUM GOLD[SM] Business-critical Support	SUNSPECTRUM SILVER[SM] Systems Support	SUNSPECTRUM BRONZE[SM] Self Support
Note: Urgent (phone/on-site)	Live transfer/ 2 hour	Live transfer/ 4 hour	Live transfer/ 4 hour	4 hour / N/A
Note: Serious (phone/on-site)	Live transfer/ 4 hour	2 hour/next day	2 hour/next day	4 hour / N/A
Note: Not critical (phone/on-site)	Live transfer/ customer convenience	4 hour/ customer convenience	4 hour/ customer convenience	4 hour / N/A
2-hour on-site response	Yes	Option	Option	N/A
Additional contacts	Option	Option	Option	Option
Premier Support Features				
Mission-critical support team	Yes	For urgent problems	No	No
Sun Vendor Integration Program (SunVIP[SM])	Yes	Yes	No	No
Software patch management assistance	Yes	No	No	No
Field change order (FCO) management assistance	Yes	No	No	No
Hardware Support Delivery				
Replacement hardware parts	On-site technician	On-site technician	On-site technician	Courier
Two day parts delivery	N/A	N/A	N/A	Yes
Overnight parts delivery	N/A	N/A	N/A	Option
Same-day parts delivery	Yes	Yes	Yes	Option
Remote Systems Diagnostics				
Remote dial-in analysis	Yes	Yes	Yes	Yes
Remote systems monitoring	Yes	Yes	No	No
Remote predictive failure reporting	Yes	Yes	No	No
Software Enhancements and Maintenance Releases				
Solaris Operating Environment enhancement releases	Yes	Yes	Yes	Yes
Patches and maintenance releases	Yes	Yes	Yes	Yes
Sun unbundled software enhancements	Option	Option	Option	Option
Internet and CD-ROM Support Tools				
SunSolve[SM] license	Yes	Yes	Yes	Yes
SunSolve EarlyNotifier[SM] Service	Yes	Yes	Yes	Yes

Support Services:

As the Sun Fire™ V440 assumes a bigger role in the data center, there is an opportunity to enhance the level of service. Customers may upgrade the warranty on the Sun Fire™ V440 to SunSpectrum Platinum, Gold or Silver.

1. Workgroup server installation services are available under part number **WGSERVER-INSTALL**.

2. Workgroup server rack installation services are available under part number **SERVER-INSTALL**.

3. Sun StorEdge Array Hardware Installation
   - (Order both of the following part numbers for each Sun StorEdge hardware only installation event.)
     ARRAY-HW-INS-BASE2

   - Per tray charge (Order in quantities of total number of disk trays being installed.)
     ARRAY-HW-PER-TRAY

4. Sun StorEdge ArrayStart
   - (Order both of the following part numbers for each Sun StorEdge ArrayStart installation event.)
     ARRAY-INS-BAS2

   - Per tray charge (Order in quantities of total number of disk trays being installed.)
     ARRAY-INS-PER-TRAY

Warranty

The standard warranty for the Sun™ Fire V440 server is three year, Next Business Day on-site response. A 90 day software SunSpectrum program warranty is available.

Education

Contact the local Sun representative.

100BASE-T	See Fast Ethernet.
Adapter	A host bus adapter or interface which plugs into a PCI slot to provide connectivity, i.e. to networks, storage, graphics or other I/O devices
ASR	Automatic System Recovery. A RAS feature that initiates a system reboot sequence that bypasses failed system components or a software failure.
Controller	A microprocessor based device which is dedicated to a specific task, esp. I/O and is embeddded within a host-bus adapter or external (storage) array. The term 'controller' is often used synonymously with host-bus adapter.
DIMM	Dual in-line memory module. A memory unit that is available in a range of capacities of 512MB or 1GB.
DIMM group	A group of four DIMMs.
ECC	Error correcting code
Fast Ethernet	IEEE standard for 100-Mb/second Ethernet. This technology supports a data transfer rate of 100 megabits per second over special grades of twisted-pair wiring.
Fault resilience	Capability of a system to mask many individual errors, but not all. This approach generally requires redundancy of some components and additional software. An example would be the dual path capability and automatic failover for storage and networks. Another term for 'high availability'.
Fault tolerance	Capability of a system to mask any individual point of failure. This type of system is typically implemented with redundancy of components and synchronization of clock signals to maintain each unit in 'lock step' with it's counterpart.
FC-AL	Fibre Channel arbitrated loop. A loop topology used with Fibre.
I2C	A bus used for environmental monitoring.
High availability	Capability of a system to mask many individual points of failure or to significantly compensate for them. This type of system is built upon standard components with limited hardware and/or software components to minimize the impact of failures. Generally, this type of system is less costly than a fault tolerant system.
Host-bus adapter	Please see Adapter
Hot-plug	A component that can be electrically safe to remove or add while the system is still running. Typically, the system must be rebooted before the hot-plug component is configured.
Mirroring	Maintaining a redundant, logical copy of a disk volume for higher availability. Also known as volume shadowing or RAID 1.
Multipathing	A higher availability option which provides two independent paths to storage and/or networks. An intermediate software layer is generally required to mask the failure of one path from the application. When both paths are functional, higher bandwidth and throughput is possible as a secondary benefit beyond higher availability.
NFS	Sun's distributed computing file system, i.e. network file system
PCI	Peripheral component interconnect. An industry-standard for connecting peripherals such as disk drives, tape drives and other external devices.

Pre-configured System	Pre-configured systems that offer discounted prices in comparison to assemble-to-order (ATO) or custom configurations. It is also more convenient for both customers and sales as it assures that all necessary components for a functional system are included with a single line item on the order form.
PTO	Please see Pre-configured System
RAID	Redundant array of independent disks. A set of disk drives that appear to be a single logical disk drive to an application such as a database or file system. Different RAID levels provide different capacity, performance, high availability, data protection and cost per unit of storage.
RAS	Reliability, availability, and serviceability, Three aspects of the design of a system contributing to continuous operation and minimizing system downtime for services. Together reliability, availability, and serviceability provide for near continuous system operation.
Redundancy	Duplication for the purpose of achieving fault tolerance. Refers to duplication or addition of components.
SCSI	Small Computer Systems Interface. An ANSI standard for controlling peripheral devices by one or more host computers.
Standard Configuration	A subset of the Pre-configured Systems (PTOs) which offer accelerated delivery time
Volume shadowing	See Mirroring

All materials are available on SunWIN except where noted otherwise.

Collateral	Description	Purpose	Distribution	Token # or COMAC Order #
Product Literature				
Sun Fire™ V440 Server, Just The Facts	Reference Guide (this document)	Training Sales Tool	SunWIN, Reseller Web	
Sun Fire™ V440 Server Customer Presentation	Customer Presentation	Sales Tool	SunWIN, Reseller Web	Token # 368875
Sun Fire™ V440 Server Data Sheet	Data Sheet	Sales Tool	SunWIN, Reseller Web	
Sun Fire™ V440 Configuration Guide	Configuration Guide	Sales Tool	SunWIN, Reseller Web	
References				
External Web Sites				
General Information on the Sun Fire™ V440 Server	http://www.sun.com/servers/entry/V440/index.html			
Features and Benefits of the Sun Fire™ V440 Server	http://www.sun.com/servers/entry/V440/features.html			
Specifications of the Sun Fire™ V440 Server	http://www.sun.com/servers/entry/V440/spec.html			
Internal Web Sites				
Internal Web Site for the Sun Fire™ V440 Server	http://vsp.east			

	Sun Fire™ V440	**Sun Fire™ V480**	**HP DL580-G2**	**Dell Power-Edge 6650**	**IBM x360**	**HP rx5670**	**IBM p630**
Size	4RU	5 RU	4 RU	4 RU	3 RU	7 RU	4 RU (Plus 2 expandable I/O drawers)
Processor Specs.	UltraSPARC IIIi 1.062GHz, 1.28 GHz	UltraSPARC III Cu 900, 1050, 1200MHz	P4 @ 2.0, 2.5, 2.8 Ghz Xeon	P4 @ 2.0, 2.5, 2.8 Ghz Xeon	P4 @ 2.0, 2.5, 2.8 Ghz Xeon	Itanium 2 @ 1.3GHz, 1.4GHz and 1.5GHz	64 bit power 4+ @ 1.2GHz & 1.45GHz
L1 (on chip) cache	32 KB instruction, 64 KB data	32 KB instruction, 64 KB data	12 KB instruction, 8 KB data	12 KB instruction, 8 KB data	12 KB instruction, 8 KB data	16KB instruction, 16KB data	64KB instruction, 32 KB data
L2 cache	1MB on Chip	8 MB	1MB (2.0) 1MB (2.5) 2MB (2.8)	1MB (2.0) 1MB (2.5) 2MB (2.8)	1MB (2.0) 1MB (2.5) 2MB (2.8)	256KB L2 1.5MB L3 or 3.0MB L3	1.5 MB L2 8 – 32 MB L3
Maximum CPUs	4	4	4	4	4	4	4
Maximum Memory	16GB	32 GB	32 GB	16 GB	8 GB	48 GB	32 GB
System Bandwidth GB/sec.	2.34	9.6	3.2	3.2	3.2	6.4	15.47
PCI slots	6 3 @66MHz 64 bit 3 @33MHz 64 bit	6 2 @66 MHz 64 bit 4 @33 MHz 64 bit	6 6 PCI-X @100MHz 64 bit	8 7 PCI-X @100MHz 64 bit 1@33 MHz 32 bit	6 PCI-X	10 3 @133MHz, 6 @66 MHz, 1 @33 MHz, 64 bit	4 – 6 PCI-X
Internal Disk Controller	Integrated Dual Channel Ultra320 SCSI	Integrated FC–AL Integrated Mulitipathing capability	Integrated Ultra160 SCSI	Integrated Ultra160 SCSI	Integrated Ultra160 SCSI	Integrated Dual Channel Ultra320 SCSI	Integrated Ultra160 SCSI
Internal Disks	4 SCSI	2 FC-AL	4 SCSI	5 SCSI	3 SCSI	4 SCSI	4 SCSI

	Sun Fire™ V440	Sun Fire™ V480	HP DL580-G2	Dell Power-Edge 6650	IBM x360	HP rx5670	IBM p630
I/O Ports	SCSI, 2 – 1 Gb NIC, 2 serial, 4 USB	FC-AL, 2 - 1 Gb NIC, 1 RJ45 serial, 2 USB	1serial, 1 network RJ-45, PS/2 mouse, keyboard, graphics, 2 USB	1serial, 2 network RJ-45, PS/2 mouse, keyboard, graphics, 2 USB	2 serial, 1 parallel, 1 network RJ-45, mouse, keyboard, 2-USB	3 RS-232 serial, 10/100 BT and 10/100/1000 BT network, 2 USB	3 serial, 1 parallel,2 network, keyboard, mouse, 1-external SCSI Ultra160
High Availability Options	Redundant 1+1 Hot Plug power, Hot plug disks, ALOM, ASR of (memory and PCI), ECC memory	Hot plug disks & power, ASR, RSC, alternate path to storage	Hot plug disks & power, auto reboot, remote monitor	Hot plug disks & power, auto reboot, remote monitor	Hot plug disks & power, cooling, auto reboot, redundant cooling, Remote monitor	Redundant hot swap power and fans, hot plug internal disks, ECC memory	Hot plug disks & power, cooling, auto reboot, redundant cooling
O/S	Solaris 8	Solaris 8	Windows 2000, Linux	Windows 2000, Linux	Windows 2000, Linux	HP-UX 11i Linux, Windows AS (64 bit)	AIX 4.3.3, Linux

4-way Xeon rack based systems:
Sun Fire™ V440 Advantages:

- Platform SPARC/Solaris from smallest configuration to largest.
- Supports more memory
- Shallow chassis depth

Most 4-way xeon systems products are limited to 8GB of memory due to hardware constraints but the few that are capable have large OS costs to extend beyond the 8GB. Sparc and Solaris supports configurations from smallest to largest.

4-way Itanium rack based systems:

Sun Fire™ V440 Advantages:

- Power and cooling is lower than Itanium servers.
- Lower Pricing in all configurations.
- System chassis only 24" depth compared to 30" depth.
- Integrated Dual 10/100/1000 Mb/s Ethernet.
- Platform SPARC/Solaris from smallest configuration to largest.
- Large number of applications written on Solaris.

Itanium is still in its infancy and lacks the OS and application support compared to SPARC/Solaris.

The Itanium systems also require more power and cooling in a much larger footprint and at higher prices than Cherrystone. It will still be some time before the risks of changing h/w, OS, and Apps may even potentially be compelling.

IBM p630:

Sun Fire™ V440 Advantages:

- Lower Pricing in all configurations
- Integrated Dual GB Ethernet.
- Platform SPARC/Solaris from smallest configuration to largest. IBM has over 10 Operating systems to support.
- Larger number of applications written on Solaris.

HP rx5670

Sun Fire™ V440 Advantages:

- Physical system only 24" depth compared to over 30" depth and 7RU.
- Lower Pricing in all configurations.
- Integrated Dual GB Ethernet.
- Platform SPARC/Solaris from smallest configuration to largest.
- Large number of applications written on Solaris.

Against competitive UNIX systems we have significantly lower pricing in all configurations, larger memory capacity and a single US-IIIi/Solaris architecture focus. We are currently the market share leader in the UNIX server space and the Sun Fire™ V440 with its memory capacity and two Gigabit Ethernet ports should continue to expand this lead.

Point - Counterpoint

This section provides anticipated comments and objections that may be encountered when presenting the Sun Fire™ V440 server.

- Clock speed of UltraSPARC IIIi systems and Sun Fire™ V440 is relatively slow in comparison to others, i.e. 1.28GHz vs. 1.6+ GHz of Intel.

  Counterpoint

  Clock speed is not indicative of performance by itself. Cycles can be used very, very differently. Consider the levels of cache and pipelining from UltraSPARC IIIi, as well as the system interconnect in addition to the clock speed.

  Also, optimizations for Java code. VIS (virtualization instruction set) dramatically improves performance for graphics, matrix operations, etc. by a factor of 2 - 3.

  While Intel processors can provide speeds in excess of 1.6+ GHz today, these are predominantly for single processor systems. The servers depend upon the Xeon family which run at significantly slower speeds. The architecture require for multiprocessors is much more complex, i.e. to insure cache consistency.

  Please note that HP and IBM RISC systems, as well as Intel and AMD, have all experienced delays with the introduction of faster processors.

- The licensing fees for the operating systems are relatively comparable.
  Counterpoint

  Windows 2000 Server supports:
  - Up to a 4-way SMP system
  - Up to 4 GB of memory
  - An unlimited number of internet connections
  - $1,995 license fee

  Windows 2000 Advanced Server supports:
  - Up to an 8-way SMP system
  - Up to 8 GB of memory
  - A two node cluster
  - An unlimited number of internet connections
  - $5,995 license fee

  Windows 2000 Data Center supports:
  - Up to a 32-way SMP system
  - Up to 64 GB of memory
  - A four node cluster
  - Available and licensed ONLY through OEMs

  Windows.NET (Future)
  - Up to a 32-way SMP system
  - Up to 64 GB of memory
  - A four node cluster

Where the Sun Fire™ V440 is the ideal solution

The following are a list of market requirements that the the Sun Fire™ V440 product was designed to achieve:
- Rack optimized to maximize CPU density per footprint.
- Overall system performance optimization
  CPU - 1.06/1.28GHz w/1MB internal cache
  Memory - up to 16 GB
  I/O - 6 PCI slots
  Networking – two 10/100/1000 Mb/s Etherent
- RAS features - Hot pluggable power supplies and disks
  - ALOM
  - ASR

Excellent features and form factor for Data center customers.

Key Features to Highlight
Price and Price/Performance
TCO
Availability
Rackable (4RU), processor dense form-factor
High-memory capacity

Compact design (24 inch depth)
Reliability and serviceability
Availability of applications
Connectivity to external storage

Where the Sun Fire™ V440 is not the ideal solution

Where internal storage capacity is the highest priority and a requirement.
Scalability greater than 4 processors.
Domains - highest levels of availability.